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ABSTRACT

The interaction of the American system of higher education with the Federal Government represents an exceedingly complex system that requires considerable study for proper appreciation and understanding. It is the broad objective of this report to further such appreciation and understanding specifically by: (1) developing a profile of the sources of production of scientific and technological manpower of U.S. universities and colleges; (2) assembling meaningful data on the nature, level, and distribution of Federal funds for academic science; (3) evolving and improving concepts and measuring techniques for ascertaining the contributions of academic institutions to scientific and technological manpower resources; and (4) testing a model for the periodic examination of the relation of Federal funds to academic science in particular, and to institutions of higher education in general. (HS)

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THE DYNAMICS OF ACADEMIC SCIENCE

A DEGREE PROFILE OF ACADEMIC SCIENCE AND TECHNOLOGY AND THE CONTRIBUTIONS OF FEDERAL FUNDS FOR ACADEMIC SCIENCE TO UNIVERSITIES AND COLLEGES

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National Science Foundation
Washington, D.C. 20550

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William V. Consolazio
National Science Foundation
Washington, D.C. 20550

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FOREWORD

The Dynamics of Academic Science

The interaction of the American system of higher education with the Federal Government represents an exceedingly complex system which requires considerable study for proper appreciation and understanding. The National Science Foundation is very much concerned with this interaction and carries out a continuous program of analysis to obtain a better understanding of the important factors of the Government-university relationship. This program of evaluation involves both studies which are financed by the National Science Foundation and are carried out by non-Government institutions or individuals, as well as studies carried out by NSF organizational units or individuals in those units.

The report, "The Dynamics of Academic Science," is the product of a study carried out by Dr. William V. Consolazio at a time when he was assigned to the NSF Planning Organization. The study introduces some novel and useful indices to relate such factors as institutional funding, degree production, etc., to Federal support, and reveals several interesting trends. The conclusions reached in the study are those of Dr. Consolazio (arrived at, of course, after many discussions with other staff members and interested individuals) and do not necessarily reflect opinions of the National Science Foundation. However, this does not detract anything from this document, which represents an important step in our attempt to obtain further understanding of the dynamics of academic science and the relationship of the Federal Government to this system.

LELAND J. HAWORTH,
Director, National Science Foundation.

January 1967

PREFACE

The academic institution probably has contributed more to science and to learning generally than any other of man's social inventions. It may be the most vital social force in Western civilization.

In the United States the institution of higher education is steeped in a tradition of local autonomy. This localized independence now faces new challenges. Under the pressures of a long-term and persistent economic need, new forms of institutional funding have gained influence and now pose a challenge to the institution's ability to determine its own destiny. In 1940 Federal funds for higher education were relatively negligible. In fiscal year 1963 the institutions of higher education in the United States received in excess of $1 billion in Federal funds for academic science. This sum constituted about 21 percent of the total income of the 700 institutions of higher learning receiving this aid. With what effects?

One approach to an understanding of the relationships which have developed between the Federal Government and the academic institution is statistical. This approach requires the identification, characterization, and subsequent analysis of all institutional resources. To accomplish these ends necessitates specialized economic and educational resource data based upon the academic institution's total income, the size and character of its student body (with special reference to graduate students and students of science), the size and character of its faculty, and the nature of its facilities. These are the inputs. There needs to be, furthermore, some specialized statistical techniques: some which are now readily available and some which must be fashioned for the purpose. These techniques must seek out the relationships between an institution's output of trained science graduates at various academic levels and productivity in science and technology. With such data and their related analyses, one may partially gauge the Federal impact on academic science.

If national planning for academic science is to have validity, then the resources available—manpower, facilities, income—must be examined periodically and in a consistent fashion. To plan sensibly the Nation's educational future, meaningful comparisons are required which can be applied to individual institutions and to various classes and types of institutions. In turn, Federal funds to these institutions must be provided in the light of such comparisons and such plans.

For much valuable assistance and advice I thank the members of NSF's Planning Organization and specifically these members of the Foundation: Charles Cohen, Joyce Hamaty, Nathan Kassack, Richard Mayer, and Dominic Sorrentino. I especially wish to express my indebtedness to Henry Birnbaum, Charles Falk and Louis Levin for their contributions to the organization and review of the manuscript. I am also very much indebted to my former associates—Harry Alpert, Samuel Aronoff, William Colman, Arthur Grad and Alan Waterman—for having read the manuscript and for many constructive suggestions. Finally, I want to express my appreciation to Leland J. Haworth, the Director of the Foundation, for his understanding of the need for studies of this type and for his encouragement in this effort.

This manuscript is, of course, the effort of one man and subject to his biases and inadequacies. Thus, the conclusions and interpretations reached are solely my own and not necessarily those of the National Science Foundation.

WILLIAM V. CONSOLAZIO,
January 1967.

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I. GLOSSARY OF SPECIAL TERMS

Academic Science: All those aspects of science and technology which are part of the curriculum, teaching, or study (research) activities of institutions of higher education, exclusive of the activities of Federal contract research centers:

AEC: Atomic Energy Commission.

Class A Institution: An institution of higher learning that in academic year 1962–1963 awarded at least one doctorate in science or engineering, or at least one doctor of medicine or dentistry.

Class B Institution: An institution that in academic year 1962–1963 awarded at least one master's degree in science or engineering or at least one doctor of veterinary medicine, but no doctorates in science and technology, nor any degrees in medicine or dentistry.

Class C Institution: An institution that in academic year 1962–1963 awarded at least one baccalaureate in science or engineering, but neither master's degrees nor doctorates in science and engineering, nor degrees in medicine, dentistry, or veterinary medicine.

Class D Institution: An institution that in academic year 1962–1963 awarded at least one baccalaureate in any field of learning but no degrees in science and engineering, medicine, dental medicine, veterinary medicine, agriculture, or paramedical subjects.

Contract Research Center, Federal: An organization exclusively or substantially financed by the Federal Government, which in most instances was established to meet a particular research and development need of the Federal establishment. In this instance, it is administered on a contractual basis by educational institutions.

Degree Accredited Institution: An academic institution granting at least a bachelor's degree, accredited by a regional board of education or a national professional society for the year of the study.

DOD: Department of Defense.

EGI (Educational and General Income) (Academic Budget): University and college income reported or received during the year under study and used specifically by an institution for educational purposes. Contract-grant research (science) funds are excluded.

FFAS (Federal Funds for Academic Science): All direct grant or contract obligations for fiscal year 1963 of individual Federal agencies in support of all scientific and technological activities associated with the educational process to all degree-granting academic institutions or individuals associated with academic institutions. Excluded are all identifiable appropriations for contract research centers, construction of graduate and undergraduate facilities, and loans.

MEEU: Medical Education-Engaged University.

NASA: National Aeronautics and Space Administration.

Nonrecipients (Nonparticipants): Academic institutions not receiving Federal funds for academic science in fiscal year 1963.

NSF: National Science Foundation.

Obligations: Funds for contracts and grants awarded during the year of the appropriation—fiscal year 1963 in the case of the present study.

Other (Agencies): Departments of Interior, Commerce, Labor and State, Tennessee Valley Authority, and Veterans Administration.

R&D (Research and Development) (Federal): Includes all direct, indirect, incidental, or related costs resulting from or necessary to research and development, regardless of whether the research and development are performed by a Federal agency (intramural) or performed by a private individual or organization under contract and grant arrangement (extramural). The terms research and development exclude routine product testing, quality control, mapping and surveys, collection of general purpose statistics, experimental production, and activities concerned primarily with the dissemination of scientific information and the training of scientific manpower.

Re (Graduate Education Index): A measure of an institution's comparative contribution to graduate education—the ratio of graduate student enrollment to total enrollment.

Rfd (Federal Funds Impact Index—Science Education): A measure of the impact of Federal funds on an academic institution's educational program (productivity) in science and technology—the ratio of Federal funds for academic science to educational productivity in science and technology (S&T DP).

Rfe (Federal Funds Impact Index—Total Income): A measure of the impact of Federal funds on the academic institution as a whole (or its total income)—the ratio of Federal funds for academic science to the institution's total income.

Rs (Science Education Index): A measure of an institution's comparative contribution to education in the sciences—the ratio of an institution's total educational output in science and technology education (S&T DP) to its total educational potential (total enrollment).

S&T DP (Science and Technology Degree Productivity): A weighted system of reducing all degrees awarded in science and technology in terms of a base unit—the bachelor's degree in science and engineering.

Total Educational Income: Theoretically, the total income of an academic institution from any and all sources available for educational or scholarly (research) purposes; in reality, the sum of the educational and general income (EGI) and Federal funds for academic science (FFAS).

University: Every institution of higher education associated with graduate or professional education even to and including institutes of science and technology and/or independent medical colleges.

USDA: United States Department of Agriculture.

USOE: United States Office of Education.

USPHS: United States Public Health Service.

II. STATEMENT OF FINDINGS

Objectives

1. Develop a profile of the sources of production of scientific and technological manpower of United States universities and colleges.

2. Assemble meaningful data on the nature, level, and distribution of Federal funds for academic science.

3. Evolve and improve concepts and measuring techniques for ascertaining the contributions of academic institutions to scientific and technological manpower resources.

4. Test a model for the periodic examination of the relation of Federal funds to academic science, in particular, and to institutions of higher education, in general.

Summary

1. The universe of higher education in the United States in academic year 1962–1963 consisted of 2,136 institutions—1,442 degree-granting (four-year) and 694 junior (two-year) colleges. Of the 1,442 degree-granting institutions, 1,257 were accredited.

The 1,063 institutions that are the science education contributing component of the degree-accredited institutions, constitute the population of universities and colleges investigated.

2. The study population included 3.4 million degree-listed students, of whom 370,000 were in graduate studies. The study group accounted for practically all those individuals who were awarded bachelor's, master's, and doctorates in science and engineering in the year studied, and all the veterinarians, dentists, and 95 percent of the doctors of medicine.

3. A total of 711 degree-accredited institutions, two-thirds of the studied population, received $1.10 billion in Federal funds for academic science from 13 agencies in fiscal year 1963. This sum constituted 21 percent of the entire income of the recipient institutions.

4. Less than 16 percent of the degree-accredited institutions (166) received 96 percent of the Federal funds for academic

science. They enrolled 51 percent of the degree-registered students and 72.5 percent of all those in graduate studies. They accounted for 75 percent of the Nation's educational productivity in science and technology (S&T DP). They awarded 56 percent of all the bachelor's degrees, 88 percent of all the master's, and 99 percent of all the doctorates in science and engineering, as well as 99 percent of the degrees in veterinary medicine, all the degrees in medicine in the study population (95 percent of the total trained in that year) and 95 percent of the degrees in dentistry.

5. Four hundred sixteen degree-accredited, recipient-of-Federal-funds institutions, almost 40 percent of the study population, received only one percent of the Federal funds for academic science. They enrolled 22 percent of the degree-registered and 10 percent of all graduate students. They accounted for 11 percent of all the Nation's educational productivity in science and technology (S&T DP units). They awarded 20 percent of the bachelor's and 4 percent of the master's degrees in science and engineering. They produced, however, only 24 (0.3 percent) of the doctorates in science and engineering, and none of the doctors of medicine or dentistry.

6. Private institutions, numbering 229, received $485 million or 44 percent of the Federal funds obligated for academic science. Public insitutions, numbering 354, received $547 million or 50 percent of the total. Denominational institutions, numbering 480, received $67 million, about 6 percent of the Federal funds.

7. The nonrecipient institutions of Federal funds for academic science, one-third of the study population, totaled 352. They enrolled 10 percent of the degree-listed and 3 percent of the graduate students. They accounted for 8 percent of the bachelor's, 0.3 percent of the master's degrees, and none of the doctorates produced in science and engineering.

8. There were 69 degree-accredited institutions that enrolled Negro students predominantly. These institutions enrolled 2.7 percent of the degree-registered students; they produced 2.2 percent of the bachelor's in science and engineering, 0.6 percent of the master's, and 0.1 percent of the doctoral degrees. They received 0.5 percent of the Federal funds.

9. There were 80 universities engaged in medical education. They received 69 percent of the Federal funds for academic science and they accounted for 43 percent of the educational and general income (academic income) of the 1,063 universities and colleges studied. They further accounted for 48 percent of

the Nation's productivity (S&T DP units) in scientific and technological manpower. They received the bulk of their Federal support—55 percent of all the Federal funds for academic science—from the U.S. Public Health Service.

10. The U.S. Public Health Service obligated 45 percent of all Federal funds for academic science; the National Science Foundation, 21 percent; and the Department of Defense, 18 percent. Ten other agencies share the remaining 16 percent.

11. The National Science Foundation was the sole support of 272, and the U.S. Public Health Service of 51 academic institutions. The Foundation supported 648 institutions out of a total 711 receiving Federal funds; the Public Health Service contributed support to 398 institutions.

Conclusions

Statistically speaking, there appears to be:

1. a direct linear relationship between the Federal funds for academic science received by academic institutions and their educational and general income (academic budget). For every $10 million universities raised in fiscal year 1963 in academic income, they raised approximately another $4 million in Federal funds for academic science.

2. at least two identifiable levels in the graduate-total enrollment characteristics of academic institutions, wherein the economics of education show marked shifts. At the upper level institutions budgeted approximately $12 million of their own for every 1,000 graduate students enrolled; for every 1,000 science and technology degree units produced, they budgeted $17 million.

3. a linear relationship between total enrollment and the academic budget (the educational and general income) and, similarly, between this same income and institutional commitment to graduate education and the education of scientific manpower (S&T DP units).

4. a direct relationship between Federal funds for academic science and the number of doctoral degrees produced in science and engineering. This relationship is a confirmation of the view that productivity in graduate education in the sciences and productivity of quality academic research are closely related, if not different faces of the same coin. On the average approximately $1 million in Federal funds is associated with the award of seven doctorates in science and engineering.

5. a mutually beneficial relationship between the Federal Government, as expressed by the funds provided for academic science, and higher education. The institutions that are the principal beneficiaries of Federal funds for academic science also seem to be those that emphasize research and the training of scientific and technological manpower—especially at the advanced degree level. These principal recipients of Federal funds also contribute their own financial resources in proportion to their productivity in science education and advanced study.

6. the upwelling of a number of significant problems as a consequence of this generally mutually beneficial relationship.

a. Patterns of support for academic science have evolved and developed to a stage where large numbers of universities and colleges participate marginally or not at all in Federal programs. These institutions may find it increasingly difficult in the years ahead to attract competent staff and students.

b. A significant number of major *private* universities, specifically those engaged in medical education and science and technology, receive a substantial proportion of their total income—upwards of 40 percent—from Federal funds. To a large degree this Federal income emanates from agencies whose basic missions are other than those associated with the advancement of higher education and principally from the U.S. Public Health Service. It appears that academic institutions may be gravitating toward an irreversible, economic dependence on the Federal Government, principally on Federal agencies whose primary scientific and technological objectives are problem solving in the national interest.

III. AN INTERPRETATION OF THE FINDINGS

State of Statistical Information

An enormous volume of statistical information dealing with higher education has been examined during this study, but the data relating to academic science and higher education have been by no means exhausted. Far too many issues were left unexplored. Available data were not always precise nor meaningful and large gaps exist in the data banks.

There is a need to reevaluate the totality of information systems dealing with higher education, academic science, and Federal funding statistics associated with academic science—not only what is collected and stored, but how it is processed, and made available. Guidance and leadership, however, must include problem-oriented specialists and individuals steeped in the traditions of academic science and higher education. Reform must go to the roots of data gathering and processing.

The time for such reevaluation is propitious. There is active participation in academic science and in higher education by all sectors of the economy. There is a renewed interest by the Congress and the President in encouraging long-range thinking on Federal programs and practices related to the strengthening of academic science and higher education.

There is a need for more precise and a wider range of statistics on American colleges and universities. More specific information is required directly related to the needs of academic science and the patterns of the relationship developing between Government and universities and colleges. Required are data reduced to the basic individual bits and stored in systems which make possible any number of statistical compilations and manipulations. Such basic information must be collected and made freely available in a fashion that is easily stored, updated and retrieved.

Statistical Measures for Universities and Colleges

The picture of the academic institution presented here is more a silhouette than a profile. It is more a simplified view of the *university* principally, and specifically, the scientific and technological component of higher education. It seems obvious that additional measuring techniques are needed that specifically delineate the more affluent from the less affluent Class A institutions, and yield a more precise picture of the Classes B and C. Certainly more studies are required in depth and in time.

There are a number of obvious weaknesses in the study due, in the main, to the statistics used, the principal being enrollment data. Enrollment statistics that combine full- and part-time student information tend to exaggerate the size of the urban university—institutions with large evening study programs and equally large part-time enrollment characteristics. The substitution of full-time statistics would have skewed the study in the other direction, by minimizing the size and educational contribution of these same institutions. Full-time-equivalent data are equally unsatisfactory, for these statistics, at best, are fundamentally guesses.

Despite the constraints placed upon the present study, sufficient value has been demonstrated to make it worthwhile to consider a continuation and an expansion. The usefulness of such an expansion is open-ended, ranging all the way from institution planning to national stock taking in resource allocation.

Gains Attributable to Federal Funds

Federal funds for academic science, on the whole, are primarily appropriated for research and for problem solving in the national interest. In general, federally sponsored academic science is research directed, and to a large degree dominated by agencies whose objectives are not those principally associated with advancing or strengthening higher education. Furthermore, it can be correctly assumed, because peer-merit systems of decision making are used in the allocation of Federal funds for academic science, that federally sponsored academic science, in the main, is also quality directed. Given these assumptions, one then may conclude that, on the whole, Federal funds for academic science are quality research directed but to a large degree restricted to circumscribed areas of academic science.

Since research dollars are obligated principally for the support of faculty, graduate students, postdoctoral associates, facilities, equipment and supplies, it stands to reason that such support has its effect on science education at the graduate and postgraduate levels primarily, rather than at the undergraduate level. This research by-product (the science education component), when combined with funds obligated specifically for education in the sciences, is not insignificant. These funds have a profound influence at the educational level. They correlate directly with manpower productivity in science and technology. (The energetic pursuit by college and university administrators of an ever-increasing share of both the Federal academic science and the research and development dollar adds further proof of the educational value of academic science funds.)

Since, on the whole, the quality-competitiveness of the research supported is basic in Federal funding practices, it may be assumed further that quality universities engaged in science and technology are also the principal recipients of Federal funds for academic science. This assumption is certainly corroborated by this study, for data indicate that the principal recipients of Federal funds are also the principal producers of advanced degree manpower in science and technology. In fiscal year 1963, 166 institutions out of a total population of 1,063 degree-accredited institutions produced 99 percent of all the doctorates in science and engineering, 88 percent of the master's, 57 percent of the bachelor's degrees, practically all the veterinarians, doctors of dentistry, and doctors of medicine. These institutions received 96 percent of the Federal funds obligated for academic science. If one grants that this circumscribed group of 166 institutions includes the major research universities of the Nation, then their educational product is bound to be of high quality by virtue of the system of quality-competitiveness in selecting them for Federal science support. Accordingly, the study reinforces the value of the peer-merit system of Federal support to academic science, for such a method of allocating funds seems to yield as an important by-product, high productivity and high qaulity advanced education in science and technology.

Marginal and Nonrecipients of Federal Funds

However, with this success, a number of problem areas appear to have developed. There is the failure of 352 institutions of higher education, the smaller and less affluent, to profit from Federal funds or participate in Federal science programs. These institutions appear to make little contribution to graduate education or education in the sciences. They, nevertheless, do train about 8 percent of the baccalaureates in science and engineering. These nonrecipients of Federal funds lack many of the educational advantages of their more prosperous relatives. The financial and intellectual-educational problems faced by these less privileged institutions must not be attributed solely to the lack of Federal funds. The majority of the nonrecipient institutions, in the main, face a condition which existed prior to the establishment of Federal programs in support of science; rather this condition is the result of long-term cultural, economic, and educational factors. Few of the nonrecipients, if any, have attained academic stature in scientific research or science education. Their financial-intellectual-educational problems have, nevertheless, been aggravated during the past 10 years. The influence of Federal funds has tended to make the recipient institutions even more attractive to faculty and students than their nonrecipient contemporaries. By increasing the attractiveness of the recipient institutions, Federal funds are inclined to limit the availability of quality faculty and students, and in fact, to encourage the concentration of high-quality people in a limited number of select institutions.

If one adds to the 10,000 baccalaureates in science and engineering produced by the nonrecipients, the 27,000 of the related 416 institutions that receive some but little Federal aid—about one percent of the Federal funds—the number of students exposed to less than the best the Nation has to offer in science education increases severalfold. These 768 institutions (352 + 416) constitute more than 70 percent of the Nation's accredited institutions of higher learning granting at least the bachelor's degree. They trained 28 percent of the bachelor's and 2 percent of the master's degree graduates in science and engineering in 1962–1963. It might be inferred that most of the 37,000 bachelor's and 1,000 master's degree graduates in science and engineering, the product of the marginal to nonparticipating institutions in Federal programs, failed to receive an education even approaching the best the Nation had to offer in the sciences.

The universities and colleges enrolling Negroes predominantly constitute a special problem. "A not inconsiderable number . . . struggle along toward the rear of the academic procession."[47] They constitute a special problem because their students at best receive a marginal education in science and technology. Other sources of higher education are unavailable to these students, both because of the inadequacy of their previous education and their financial limitations. Since institutions that enroll Negro students predominantly will continue for some years to come as the backbone of Negro higher education in the South, the problem of raising their educational capabilities is pressing and immediate.

Within the group of 416 marginally supported institutions are some rather distinguished liberal arts colleges. Accordingly, the references to lack of quality need modification. However, quality statements related to depth and variety of the curriculum in science and technology still obtain. Those liberal arts colleges which have accepted educational roles in science and technology appear to stand high in rank ordering by whatever criteria used, considering their small enrollment. They are active participants in Federal programs for academic science and substantial producers of the baccalaureate degree in science and engineering. Their educational and general income level is especially significant in that it indicates a high degree of affluence, independence, and participation in quality education.

The survival of the liberal arts college, in some respects, depends on the degree to which it can continue to attract sufficient numbers of sophisticated faculty and students in the sciences. The value gained from the limited statistics available and the critical and transitional state of liberal arts education adds a sense of urgency to further exploration of the characteristics, aspirations, and direction of liberal arts institutions.

The educational and fiscal problems of the nonrecipient and marginally participating academic institutions are not the result of Federal programs in support of academic science. Basically, the primary purpose of Federal funds is the advancement of science and technology in the national interest. If these funds have an influence on educational institutions, it is because of the intimate relationships that exist between academic research and graduate and professional science education. Accordingly, the failure of Federal funds to reach each and every institution of higher education should not serve as a basis for criticism of the present system of dispensing academic science funds. Such criticism, especially the failure to give aid to the vast population of smaller and less affluent institutions, can only have validity if such aid were the prime objective of these funds. There has been a tendency to hold Federal programs in support of science responsible for failures that could well be attributed to lack of local initiative and regional responsibility, and inadequacy of standards for educational programs.

It is worth reemphasizing that Federal programs in support of academic science have gained for the United States a position of world leadership in research.[20] They also have brought high standards and quality to the Nation's science education and training programs. Since the basic purpose of the Federal support program previous to fiscal year 1963 was the funding of research, and since a large proportion of the program funds were obligated for problem solving in the national interest, it is difficult to understand how issue can be taken with the present system of funding science because it tends to concentrate the educational benefits in a limited number of institutions.

Institutions Dependent on Federal Funds

Another problem area associated with Federal support of academic science is what appears to be a developing irreversible dependence of the Nation's principal universities on Federal programs whose funds in support of science and technology are appropriated for problem solving in the national interest. In fiscal year 1963, 711 institutions received 21 percent of their total income from Federal funds for academic science. About one-half this sum came from one agency, the U.S. Public Health Service, whose mission is improving the Nation's health. Only 20 percent of the total Federal funds available came from Federal agencies whose objectives were principally strengthening academic science and higher education.

The bulk of the funds (96 percent) were concentrated in 166 institutions—principally the universities. Twenty-two of these institutions, the *Class A private* institutions predominantly, received 40 percent or more of their total income from Federal funds. Added to this, is the fact that 35 percent of the total income of the private and denominational, medical education-engaged universities came from this same source. That the *private* component, of the major advanced degree producer institutions of scientific manpower, depends so heavily on Federal funds appropriated for problem solving in the national interest, is sufficient cause for a reexamination of the Federal system of support to academic science; it is also cause for the academic institution to reexamine itself and its relationship to the Federal Government.

To make matters even more worthy of consideration, the large dependence of academic science on the support of the U.S. Public Health Service raises questions concerning the wisdom of continuing to bias the overall support of academic science and the related educational sequalae principally in terms of the interests of one Federal agency. As academic science continues to increase its dependence on Federal funds, the growth and development of the education component should not become dependent on support programs that fundamentally fulfill the objectives of the sponsor, irrespective of how enlightened that agency's practices may be.

According to James Perkins:[50]

> It is the casual, unreflective, opportunistic development of interests for the sole purpose of attracting funds for prestige which obviously violates integrity.

Allied to this question of academic institution dependence on one agency, are those that focus on institutional, regional, and field-of-science distribution of Federal funds. The high level of funding by one agency, the U.S. Public Health Service, in a limited number of major universities—those principally associated with medical education—is one of the reasons for the present patterns of distribution of Federal funds. All considerations dealing with concentration or distribution of these funds, whether by region,[51] by activity of science, or by discipline are weighted by the policies and programs of the U.S. Public Health Service. The sums made available to academic science by this one agency are so large, and yet so circumscribed (because of the nature of their appropriation), as to affect greatly any policy considerations related to allocation of scientific and educational resources and Federal funds. Accordingly, Federal funds are apt to converge in those areas of science and regions of the United States where medical education is concentrated.

Federal Funds and The Future of Academic Science

There is no simple answer to such questions. Restricting or reallocating the problem solving component of Federal funds for academic science to bring about a more equitable distribution of funds among Federal agencies, by fields of science, by regions, and institutions would do irreparable damage at this time to the Nation's basic research and science education programs. In the first instance the concept "equitable distribution" too frequently has a personalized and biased meaning. But more important, academic science and higher education even now are irreversibly dependent on such Federal funds. The answer certainly does not lie in a policy that concentrates on institutional support to the detriment of individual project research support, for there appears to be too beneficial a secondary effect on institutional quality resulting from the direct support to scientists and of research selected solely on the basis of merit. The support of the institution at the expense of the individual scientist or project research can do irreparable harm to a system of quality-competitiveness, whose results are high national standards for scientific research and for science education. Quality science education at graduate and professional levels can be pursued only after quality research has become fairly well established and is a normal activity of the academic institution.

The use of Federal funds in support of individual project research does not seem the proper vehicle for broadening the institutional and regional base of academic science. Objectives to broaden the base can be served best by increasing the level of Federal funds appropriated directly for higher education and science education, funds specifically for strengthening departments of science and institutions of higher learning. Programs are being introduced for these purposes. But in spite of these accomplishments there is still room for improvement; there is clearly a need for new and additional forms of support to academic science. One such system could be a generalized science education support program based on an institution's productivity or potential in science education. With the resources and the talent available in both Government and academic institutions, it should be relatively simple to develop the necessary administrative tools and support programs to encourage and exploit the best in science education and to make quality education available to all.

Gerard Piel recently testified:[45]

> . . . as against some simple minded formula based upon population and income, the availability of financing on the Federal scale invites the most generous and wise imaginations in American higher education to join in the framing of new objectives, new standards, and new kinds of fiscal instruments.

No Federal program in support of academic science, however, should be undertaken at the expense of existing quality institutions or by denying adequate financial assistance to productive scientists. The encouragement of quality research should continue to be national policy. The ideal policy for the support of academic science should continue to be one that strengthens science quality wherever it is found and that reaches for the highest of quality standards in scientific research and science education.

IV. GOVERNMENT-ACADEMIC SCIENCE RELATIONSHIPS

The Morrill Land-Grant College Act of 1862 set the stage for the nurturing of academic science by the Federal Government. The Act donated:

> . . . public lands to the several States and Territories which may provide colleges for the benefit of agriculture and the mechanic arts.

Then for the first time, the Government of the United States, without fully anticipating the consequences, began influencing the course and strength of science at universities and colleges. The intention at that time was not to strengthen academic science for its own sake. The Congressional objective was more practical and immediate. The Morrill Act had as its basic purpose the advancement of agriculture and the mechanic arts for the very contemporary needs of an expanding Nation.

World War I saw the beginnings of the harnessing of academic science to serve directly the needs of Government itself. Such service, however, as university and college scientists could provide was disassociated from the institution and campus. Academic scientists went to war, so to speak. They came under direct military control, either as scientists in uniform or as civilians working for the various military establishments, such as the Army Signal Corps, the Navy Bureau of Ordnance, and the Army Medical Corps. According to Hunter Dupree:[1]

> Basic science . . . did not fare well during the war years. Long-range programs suffered not only in Government bureaus, but also by absorption of investigators from universities . . . by robbing the colleges, universities, and industries of trained scientists . . . but at the expense of basic research and of training new men.

World War II and Its Consequences

Possibly based on this experience and probably because of the recognition of the importance of military technology, World War II witnessed a fuller interplay between the Federal Government and academic science through the establishment, by Executive Order in June 1941, of the Office of Scientific Research and Development (OSRD)[2] with Vannevar Bush as its Director. It was to serve:

> . . . as a center for mobilizing of the scientific personnel and the resources of the Nation in order to assure maximum utilization of such personnel and resources in developing and applying the results of scientific research for defense purposes.

The magnitude of the Office of Scientific Research and Development fiscal operations for its full life (1941–1946) just exceeded $550 million. Even though this budget was for all research and development and not restricted solely to academic science *per se,* the OSRD's impact on academic science was far-reaching.

The wartime research effort, and in particular the relationships established by the OSRD with academic institutions—further developed by the Office of Naval Research—brought about a number of significant changes in Government-academic science relationships, many of which have persisted as policies and practices of the several Federal agencies which currently support scientific activities. The use of the contract as the basic vehicle for the conduct of academic research, the fixing of substantive responsibility upon the individual scientist, emphasis on project research, the use of panels of scientists in decision making, dedication to high-quality research—all these set the tone and pattern for the present Government-academic science relationships.

The exigencies of war compelled the OSRD to focus on the applied sciences, especially as they related to the pressing military needs of Government. This emphasis on applied science, to a degree, accounted for its demise almost immediately after the close of the war. The fact is that it was never intended to persist as a permanent organization of Government. In 1945 Vannevar Bush advanced the concept of a National Research Foundation to continue the basic research aspects of the OSRD—the strengthening of academic science. His report, *Science, The Endless Frontier,*[3] is a landmark for its vision and its statesmanlike persuasiveness. Under a program for action, Dr. Bush recommended:

> The Government should accept new responsibilities for promoting the flow of new scientific knowledge and the development of scientific talent in our youth. These responsibilities are the proper concern of the Government for they vitally affect our health, our jobs, and our National security. It is in keeping also with basic United States policy that the Government should foster the opening of new frontiers, and this is the modern way to do it.

After a period of legislative soul searching shared by the scientific and academic community, the Congress, and the President of the United States, Public Law 507 of the 81st Congress, the National Science Foundation Act, became law in 1950. In the meantime, the Atomic Energy Commission and the office of Naval Research (ONR) had been established (1946). By 1950

ONR had become the dominant force in academic science. The National Institutes of Health, established in 1930, underwent marked growth and change during this same period. It had become a leader in the support of medical research; its research and training programs were already a significant force in the medical schools of the Nation.

In fiscal year 1951, the year the National Science Foundation became operational, the Federal Government obligated $172 million to nonprofit institutions for scientific research and development.[4] These funds, in contradistinction to funds for academic science (that is, the broad spectrum of research and education activities), were fundamentally for research, including plant and construction. An additional $122 million was obligated to contract research centers. In that year the National Science Foundation received an appropriation of $225,000.

The years 1945–55 were years of preparation, adaptation, and stabilization for Federal academic science programs. The Office of Naval Research and the National Institutes of Health accepted a substantial part of the burden for the academic sciences formerly supported by the Office of Scientific Research and Development. They had expanded their support far beyond the former OSRD interests. The Atomic Energy Commission did not become a force in academic science until the turn of the decade, about 1950. For up until that time the Office of Naval Research had either managed the Atomic Energy Commission component of academic science or had been supporting this area with its own funds. The U.S. Department of Agriculture, the only other Federal agency with influence in academic science at the time, continued in its traditional support of university and State experiment stations at support levels similar to those of the prewar years.

Between 1945 and 1952 the university research and development budget of the Federal Government (including funds for contract research centers) increased from $120 million to $280 million.[5] Probably not more than half of this amount was for the support of research at academic institutions.

The Influence of The Sputniks

In 1957 came Sputnik; it created the sort of national consciousness of international competitiveness that usually arouses a nation to action. Sputnik brought about an awareness of the needs and value of this country's science and technology, thus focusing attention on scientific and technological manpower.

Nicholas DeWitt two years earlier had already documented the state of Soviet professional manpower[6] so that, by the time the Sputnik was orbiting the earth, the Federal Government was taking steps to raise the quality of United States scientific and technological education. The years immediately following Sputnik saw the introduction of programs to upgrade science teachers (science institutes) and the promotion of programs to draw research talent into the system of science teaching. Mechanisms to evaluate and revamp teaching in secondary school physics (course content improvement) were among the many innovations.

Sputnik also brought about a change in the political structure of the White House. For the first time science was formally represented at the highest level of Government. James Killian, President of the Massachusetts Institute of Technology, became the first Special Assistant to the President for Science and Technology. Following the establishment of the Office of Science Advisor to the President there was established by Executive Order the Federal Council for Science and Technology (1959), later followed by the establishment of the Office of Science and Technology (Reorganization Act No. 2, June 1962).

The Present

In fiscal year 1958, the level of Federal funds for support of science at colleges and universities proper was $282 million.[7] It rose to $802 million in fiscal year 1962, and to $1,178 million in fiscal year 1964. The so-called total research and development budget for the Federal Government for fiscal year 1958 was $4.5 billion. It rose to $10.4 billion in fiscal year 1962, and $14.7 billion in 1964.

It was the billions in the *total* Federal research and development budget, especially beginning with fiscal year 1962 ($10.4 billion), that aroused the Congress to the spectacular growth that had occurred in the Nation's research and development activities. In that year the National Aeronautics and Space Administration accounted for $1.4 billion of this total $10.4 billion obligated. In fiscal year 1963 the National Aeronautics and Space Administration's research and development budget was $2.8 billion, and in the following year it rose to $4.2 billion. The sudden rise in the total Federal research and development budget, resulting from the National Aeronautics and Space Administration's expansion, exposed a number of problems relating to the character of Federal science support with which the Congress, the Executive Branch of Government and the scientific community are still wrestling. In 1962 the first major investigation of a Federal research program was instituted by the Congress of the United States. The investigations which began with those of the U.S. House of Representatives Subcommittee of the Committee on Government Operations (the Fountain Committee) [8] have continued into this last Congressional year.

To some members of Congress the total Federal research and development budget became confused with the support of academic research. The need for recognition of the distinction between Federal research and development as such and Federal funds for academic science was underscored by the new Director of the National Science Foundation, Dr. Leland Haworth, who drew attention to this problem by devoting a significant part of his 1964 message[9] to a clarification of the issues involved. He asked:

> What are the facts? How can the figures be presented in their proper perspective?

He then went on to say:

> . . . the familiar term 'research and development' does not refer to a single entity. On the contrary, it covers a very broad range of scientific and technological activities. These activities range from the most fundamental and basic research to the development of highly complex devices. The convenient abbreviation R&D can be dangerous in that it can lead to confusion and misunderstanding.

In 1963 the Subcommittee on Education and Labor of the U.S. House of Representatives (the Edith Green Committee) [10] published a most informative report on Federal support to education. A part of the report was statistical and focused on Federal support of science and its effects on higher education. In 1963 an extensive study was undertaken by the Select Committee on Government Research of the U.S. House of Representatives (the Carl Elliott Committee).[11] Ten reports and a resume were prepared by the Elliott Committee staff; they dealt with the administration of science and technology, Federal facilities, science information, student aid, influence of Federal practices and policies, coordination, and national goals. At about the same time the U.S. House Committee on Science and Astronautics, and especially the Subcommittee on Science, Research and Development (the Daddario Committee), undertook a series of investigations on the state of the Nation's science. A number of reports were issued of which the most significant are those dealing with basic research and national goals,[12, 13] scientific-technical advice for Congress,[14] geographical distribution of Federal research and development funds,[15] and a 15-year review of the National Science Foundation.[16] Concomitantly, the Committee on Government Operations of the U.S. House of Representatives (the Reuss Committee) undertook hearings and prepared a report on research programs and national goals for higher education.[17]

The Need For A Public Policy for Academic Science

In March 1965 the Committee on Science and Public Policy of the National Academy of Sciences (the Kistiakowsky Committee) broke new ground by the preparation of a report for the U.S. House Committee on Science and Astronautics on basic research and national goals.[15] The 15 separately written essays appearing in this monograph emphasized the complexity of the task facing the Nation with respect to planning for the support and promotion of research. Subsequent investigation of the Reuss and Daddario Committees further emphasized the complexity of the issues involved in establishing national goals for science. Much of the testimony before these Committees scored the difficulties in reaching a consensus and the dangers of generalization. The Daddario Committee[16] endorsed the views of the National Academy of Sciences Committee on Science and Public Policy. It acknowledged:

> . . . the complexity of the two questions posed for advice, and the difficulties in the way of substantial agreement among the various disciplines of the scientific community on specifics of these questions. Viewed in this light, it is understandable that simple, clear-cut answers to these questions are not likely to appear.

It went on to say:

> Nonetheless, answers must be sought.

As a consequence of a number of parallel studies undertaken by the Executive Branch of Government, the White House, on 13 September 1965, issued the now famous Presidential memorandum—"Strengthening Academic Capability of Science Throughout the Country."

This memorandum marked the significance of higher education and academic science in fulfillment of the Nation's goals. It gave direction to Federal policy for academic science, establishing that:

> A strong and vital educational system is an essential part of the Great Society. . . . The strength of the research and development program of the major agencies and hence their ability to meet national needs, depends heavily on the total strength of our university system.

The philosophy of the Federal Government has advanced to a stage where the Establishment is now irrevocably committed to the support of higher education,[18] to the arts and humanities,[19] and to science and technology. The rise in the Federal research and development budget, the explosive growth of the technological programs of the National Aeronautics and Space Administration, the confusion of the concepts "research and development" and "academic science," the establishment of substantive committees on science and technology in both houses of Congress, the expanding role of the White House in science and public policy, the urgency for strengthening the system of education and academic science in the United States, all have focused attention on the need for further elaboration of public policy on academic science, especially with respect to the role of the Federal Government and its instrumentalities—the Federal agencies.

If the goal to "Strengthen Academic Capability of Science Throughout The Country" is to be given meaning, it then is incumbent upon the Nation to appraise, on a continuing basis, the nature and the needs of academic science.

V. STUDY CHARACTERISTICS AND CONSTRAINTS

Objectives

This study attempts in a limited way to assemble the pertinent academic institutional data, to develop concepts and hypotheses, and to provide techniques for examining these data in terms of a rationale which seeks to elucidate the impact of Federal funds on academic science and on higher education. To be more specific, the study objectives are to:

1. assemble meaningful data on the nature and level of Federal funds for academic science.

2. develop a profile of the sources of production of scientific and technological manpower of United States universities and colleges.

3. evolve and improve concepts and measuring techniques for ascertaining the contributions of academic institutions to scientific and technological manpower resources.

4. test a model for the periodic examination of the relation of Federal funds to academic science, in particular, and to institutions of higher education, in general.

Even with these limited objectives, the constraints on the available statistics restrict the extent and scope of this study. Nevertheless, data have been assembled and developed which make possible analyses of the support of academic science by Federal agencies and of the related activities of institutions of higher learning in the education of scientists and technologists.

Basic Premises

The assumption basic to this study is that prior to fiscal year 1963 Federal funds for academic science (especially funds for academic research) were obligated for research, for other activities of science, and to scientists on the basis of quality, predominantly. (Since this study was undertaken, a number of science programming changes have occurred throughout the Federal establishment.) This assumption bears on the views expressed by the Committee on Science and Public Policy of the National

Academy of Sciences:[20]

> The commitment of large public funds for the support of basic research in universities has led not only to spectacular growth of the scope of scientific effort but also to advances in quality: American science has reached a position of world leadership.

Accordingly, the level of scientific support for the *universities*[21] must be assumed to be indicative of the quality of the scientific research and can, in rough measure, be related to the quality of the science education and hence the scientific quality of an institution. These quality inferences, therefore, are drawn from the level of Federal funds for academic science. (They pertain to the study period under investigation only.) If such assumptions and inferences are admissible, then one can invert the process of deduction and postulate that the quality institutions engaged in science and technology—principally the universities—receive the largest share of Federal funds for academic science.

Academic science and science education although related are not synonymous. The effect of Federal funds for academic science on science education on the whole has been beneficial and is in the nature of a bonus. In fiscal year 1963, Federal funds for academic science directed specifically at science education were not in large supply, for the bulk of Federal funds obligated were fundamentally for research. Therefore, though this study seeks to elucidate the educational relationships and influences of Federal funds for science, it must be recognized that the impact (educational gain or loss) can be examined only indirectly. The relationship is a tangential by-product of a larger program whose objectives are related but different: the strengthening and exploiting of academic research.

Most academic research funds are obligated and used to reimburse an institution for faculty salaries, postdoctorate associate stipends, or graduate assistantships, for the purchase of equipment and supplies, and for related indirect costs. Academic research is an integral part of graduate and advanced science education. When research funds contribute to education, the contribution is most apt to be at the graduate and professional levels rather than at the undergraduate level. The contribution is of major significance though its effect may not be directly measured.

If it is granted that the quality scientific universities are those that are the major recipients of Federal funds for academic science, and if it can be shown further that these same institutions are also the largest producers of scientific and technological manpower, especially graduate and advanced degree manpower, then the study will have demonstrated another and important contribution of Federal support programs for academic science—the strengthening of training in the sciences.

This study undertakes to demonstrate, among other things, that some institutions (or groups of institutions) of higher education by virtue of their educational achievement (characterized by contributions to higher education, by graduate education output and capability, and by contributions to education in science and technology) attract more Federal funds than do others. The study further seeks to demonstrate that there is a relatively simple relationship between the level of Federal funds attracted by an institution and the extent of educational achievement. To oversimplify the argument: if funds for research are provided by the Federal Government on the basis of merit, then the amount of such funds should provide a rough measure of the science merit of institutions, and, in turn, such a relationship should be reducible to sets of indices and metrics. A case for such indices and measures will be proposed. And if such metrics have value, it should be possible to detect strengths and weaknesses in the educational fabric, and formulate plans and programs to deal with problems in the system of science education, particularly at the advanced study level.

These arguments are specifically, but not exclusively, directed to a consideration of universities. The liberal arts colleges are not treated critically in this study on the same terms. On the whole, they are not major producers of research or of advanced degrees in science and technology, although they train significant numbers of potential scientists and engineers. Neither are they the recipients of large quantities of Federal funds.

Quality considerations are limited specifically to the assumptions developed in the preceding discussion, and only to academic institutions in the aggregate. No quality reference is implied with respect to individual institutions, their faculty, or students. This inability to deal with individual quality is recognized as a basic weakness of this and all other statistical studies of a similar nature.

The Academic Institution

The principal sources for qualifying, classifying, or evaluating academic institutions are the Office of Education's *Education Directory*[22] and the American Council on Education's *American Universities and Colleges.*[23]

The academic institutions studied consist of 1,063 accredited institutions of the United States which granted at least one baccalaureate in the academic year 1962–1963, with these exceptions: seminaries and theological schools; maritime and military academies; specialized professional schools not engaged in scientific education; business colleges; junior colleges; schools of music, art, fashion, design and theater; and industrial and proprietary institutions.

Accreditation is an instrument by which state, regional, and national organizations—some educational and others substantive—evaluate and qualify educational institutions. According to the *Education Directory*, institutions qualified by one or more accrediting bodies are said to be accredited. Accreditation and degree-granting characteristics were employed to qualify and delimit the population of institutions in order to create a manageable and meaningful group of institutions—meaningful in the sense that they contribute or produce something positive to higher education for society generally or for science and technology specifically.

A new system of classification of universities and colleges based on the education and training of scientists and technologists is introduced in this study in contradistinction to the more generalized classification method employed by the Office of Education.[22] Academic institutions are grouped into four classes according to the level of scientific and technological education (in the academic year 1962—1963). The classification system is based on data sources of the Office of Education,[24] the American Medical Association,[25] and the American Dental Association.[26]

Class A: Institutions of higher learning that awarded at least one doctorate in science or engineering, or at least one doctor of medicine or dentistry. (The choice of the word *class* in no way implies quality or value.)

Class B: Institutions that awarded at least one master's degree in science or engineering or at least one doctor of veterinary medicine, but no doctorates in science and technology, nor any degrees in medicine or dentistry.

Class C: Institutions that awarded at least one baccalaureate in science or engineering, but neither master's degrees nor doctorates in science and engineering, nor degrees in medicine, dentistry, or veterinary medicine.

Class D: Institutions that awarded at least one baccalaureate in any field of learning, but no degrees in science and engineering, medicine, dental medicine, veterinary medicine, agriculture, or paramedical subjects.

Academic institutions are also classified according to the controlling body or responsible governing body—private, public, or denominational. The legal control of an institution—not the support or affiliation—as reported by each of the institutions, is the factor determining an institution's designation according to the *Education Directory*. Public institutions may be municipal, county, district, State, regional, or Federal in control. Private institutions are those institutions that are independent of church or local, State, and national government, even though there may be some affiliation or legal connection. Their legal control is private; their board of trustees is usually a self-perpetuating body. Denominational institutions are also private, but their legal control is centered in a church or religious group, order, or organization. (Institutions controlled by such organizations as the Friends Society or the Young Men's Christian Association are here classified denominational.) There were a number of institutions wherein the control was mixed, e.g., Pennsylvania State University and Howard University. They were classified according to their principal source of support—public in both the above instances.

In many cases there are notable differences in student body, faculty, curricula, level of education, and income between private institutions of higher learning and their counterparts, the denominational institutions. The denominational institutions make up about one-half of the degree-accredited academic institution population; the vast majority tend to fall within the liberal arts college group. An additional large number of the nonaccredited degree-granting institutions (those not studied here) also may be denominational in control. It is the consensus that these denominational institutions as a group now yield limited contributions to advanced education and to education in the sciences, but they are potential resources for science-education growth in the Nation.

Two additional variant segments of the degree-accredited academic institution population also were studied. They are the institutions engaged in medical education and those predominantly enrolling Negroes. There has been reason to suspect that medical education-engaged academic institutions as a group are the greatest recipients of Federal funds for academic science and that they, in turn, are the highest producers of scientific manpower. It has also been suspected that academic institutions enrolling Negroes predominantly are at the other end of the spectrum—those least involved in academic research (as measured by level of Federal funds), and those least involved in advanced education in the sciences. Accordingly, measuring devices were sought to test these hypotheses.

A surprisingly puzzling question was: What is an academic institution?[27] The guidelines established in the Office of Education's *Education Directory* were carefully followed except in cases of institution complexes. In such cases the rule followed was to preserve the identity of the institution basic subunit especially when the subunit was clearly on its own and separately administered, e.g., Pomona College of the Claremont Graduate School and University Center complex, or the University of California at Berkeley of the multiversity system of the University of California. If, on the other hand, the complex was still in the formative stage, as in the case of the emerging Duluth campus of the University of Minnesota or that of the Milwaukee campus of the University of Wisconsin, and if the resource data were not available or only partially available for the emerging unit, the complex was treated as a single entity, e.g., the University of Minnesota or the University of Wisconsin.

The Substance of Academic Science

The concept academic science adopted here is fundamentally that developed in "Sustaining Academic Science, 1965–1975."[28] The substantive aspects include those undertakings in science and technology which are part of the curriculum, teaching, or study (research) activities of institutions of higher learning. Naturally such activities are educationally related. Briefly stated, the concept embraces all aspects of science and technology—mathematics, physical, life, social, and engineering sciences as supported by the National Science Foundation,[29] and medicine, paramedicine, veterinary medicine, dentistry, and agriculture.

Federal funds for academic science include all those activities associated with research, science education and training, science information, science development, institutional base grants, and contract funds. They do not include those scientific activities associated with loans; neither do they include activities associated with obligations for plant and construction, nor with funds for contract research centers.[7] Specialized facilities—accelerators, oceanographic and space facilities, computers, biotrons, etc.—and their bricks and mortar counterpart are included within the concept of academic science; graduate and undergraduate facilities are not included. The bricks and mortar component of specialized facilities is not separated for at best it would have been the result of an arbitrary decision of an administrative or fiscal office of the supporting agency, and, therefore, such refinement would have added little of value to the study.

Federal funds for academic science constitute the direct grant or contract obligations of individual Federal agencies in support of science to academic institutions or individuals associated with academic institutions. Accordingly, all science and technology fellowship and training programs and their cost-of-education allowance are charged as obligations to the institution hosting the fellow or administering the grant. Funds associated with activities dealing with upgrading science and mathematics curriculum and education methodology and technique are included, though it is recognized that a number of the curriculum study grants[30] contracted for with universities and colleges are located within particular institutions merely for convenience. But since a number of these studies contribute directly to the educational life of the grantee institution, the inclusion of these data are considered to be more, rather than less, proper. Financially, the total is not very large, so that at those institutions where the study is located for administrative convenience, the discrepancy is not too distressing.

All the activities of science and technology included within the boundaries of academic science as defined in this study probably contribute to the advancement of academic science and technology. The definitions of "basic" science and engineering imposed by the grant support characteristics of the National Science Foundation[20] and the addition of medicine, paramedicine, dentistry, veterinary medicine, and agriculture create a sufficiently broad umbrella to cover just about every area and activity of science and technology associated with academic institutions.

The largest single portion of Federal funds for academic science comes from the U.S. Public Health Service, and a significant amount comes from the U.S. Department of Agriculture. In this study, medicine, paramedicine, dentistry, veterinary medicine, and agriculture are included as a part of the life sciences just as engineering is included as part of the physical sciences. The financial contributions made to these activities are examined as are the related manpower characteristics—the scientists and technologists, doctors of medicine, paramedical specialists, veterinarians, dentists, and agriculturists.

Funding Characteristics

The fiscal data[31] assembled are principally of two types—academic science support by Federal agency—that is by Federal source; and academic institution—educational and general—

income (EGI) by individual college and university—that is by academic user or performer. Federal funds for academic science (FFAS) data for the fiscal year 1963 are reported by support agency and by class and control of individual universities and colleges (Table A–1). The educational and general income,[23] which is exclusive of all grant-contract research funds, is for the academic year 1962–1963, and is used here as the institution's education expenditure—the academic budget—for the year (Tables A–1, A–2).

The educational and general income is the university and college income reported or received during the year under study and used specifically by an institution for educational purposes. It includes all income derived from investments, as well as *direct* municipal, State, or Federal [32] appropriations to that institution for educational purposes; it includes student fees and gifts or appropriations for capital purposes and/or operational purposes. It excludes grant-contract research (science) funds, auxiliary income (income from sales, student rental fees, etc.), student aid, and income specifically earmarked for endowment.

The educational and general income, when added to Federal funds for academic science, serves as a measure of an institution's financial resources for research and education (total institututional income).

Federal funds are used as a measure of an institution's total contribution to research in lieu of the grant-contract research (science) funds requirement.[23] Fortunately, non-Federal grant-contract research funds and Federal funds for education in the year studied are sufficiently sparse so as to give meaning to the substitution.

The source of the educational and general income statistics in all but a few cases was the 9th edition of *American Colleges and Universities.*[23] In a number of cases these data were not available. In Class A institutions where EGI data were not available, the information was obtained directly from the institution. In the other classes—B, C, and D—EGI estimates of some 25 institutions were made, based on enrollment data. In each case, where estimates were made, they are so indicated (Tables A–1 and A–2). Analyses based on estimates were considered preferable to the exclusion of any institutions from the study.

Construction funds, in the sense of bricks and mortar, where identifiable (graduate and undergraduate facilities), are excluded so as to avoid the statistical perturbations caused by nonrecurring obligations dealing with Federal funds for academic science. All identifiable contract research center data also were excluded from the study, though it was recognized that some components of contract research centers and others in their entirety[27] contribute to the education process. The decision taken to eliminate such data was based on the fact that the principal objective of most of the contract centers is to meet the special needs of the Federal agency providing the support, hence their contributions to science education are generally peripheral. Extracting the pertinent educational component of Federal funds from the research centers associated with educational institutions would have been almost impossible. On the other hand, contract centers are so few and usually so large that their educational impact can be ascertained, if needed, by individual case study.

Federal funds data were procured principally from the annual reports of Federal agencies, and, in a few instances, from special reports prepared for the Congress or directly from other official sources of pertinent Federal agencies.

The obligations ascribed to the Department of Defense (DOD) are incomplete.[28] The DOD reports depended upon, stated that the compilation contained "awards of $10,000 or more to U.S. institutions." The missing elements probably do not affect appreciably the DOD and Federal funds total. The missing parts, however, may distort those analyses which deal with the Federal support to the less affluent institutions, and, as a consequence, may not adequately reflect the Defense Department's contribution to the liberal arts colleges and to the smaller institutions of higher education.

Recently the U.S. Office of Education (USOE) has become a significant factor in the support of higher education. Unfortunately the data assembled here reflect only the beginning of the USOE expansion period; they, accordingly, should be considered only with these limitations in mind.

Thirteen Federal agencies reported programs in support of academic science in fiscal year 1963. The major support agencies were the Department of Defense (DOD), the National Aeronautics and Space Administration (NASA), the Atomic Energy Commission (AEC), the U.S. Public Health Service (USPHS), the National Science Foundation (NSF), the Office of Education (USOE), and the Department of Agriculture (USDA). The other six agencies which provided lesser support for academic science are classified as "Other." They were the Departments of Interior, Commerce, Labor, and State, the Tennessee Valley Authority, and Veterans Administration.

Manpower Characteristics

The manpower input and productivity[25] measures most relied upon to weigh the size of an institution and its participation in and/or contribution to higher education in general, and science education in particular, are the well-established statistics developed by the Office of Education for the academic year 1962–1963. They deal with total enrollment,[26] graduate enrollment,[27] and numbers of degrees granted in science and engineering and in veterinary medicine.[24] These manpower statistics are augmented by those for doctors of medicine made available by the American Medical Association,[25] and those for the doctors of dentistry based on studies of the American Dental Association.[26]

Faculty statistics, which exist in quite some detail for some institutions, especially universities, would have been most helpful in ascertaining quality in education. A measure of the ratio of the number of students to faculty might also have been informative. Unfortunately, a significant part of the data available is much too unreliable. There is both a lack of definitional uniformity and inadequate coverage of the institution universe. Postdoctoral data would also have contributed to the consideration of quality in science education. Such data as exist are inadequate. The fact of the matter is that statistics in this area will become available only when there is agreement on what constitutes a postdoctoral associate. There is no doubt that high concentrations of postdoctoral associates are characteristic of those institutions at the cutting edge or frontier of scientific inquiry. Accordingly, the statistic could be of value in quality determinations.

Dealing with more than 1,000 institutions, which are categorizable into four classes and three legal entities, makes tabulation comparisons for quality or quantity an exercise in futility. In spite of this, the need to know an institution's total output in education and how it allocates its own educational resources is fundamental to any appraisal of the educational establishment. How it divides its energies and efforts between undergraduate and graduate activities and between science and technology and other academic activities is basic and essential to the pursuit of this study. This need far outweighed the disadvantages. Accordingly, a metric was introduced—a standard for measuring manpower productivity at all levels of science education.

In order to put together such a metric, a scale was required for computing the institution's total ouput or its total productivity in science and technology—the reduction of all degrees in science and technology into a unit system based on a common denominator. The most logical base for expressing science and technology manpower productivity is, of course, the bachelor's degree in science and engineering. Accordingly, a weighted system of reducing all degrees awarded in science and technology in terms of the bachelor's degree in science and engineering was instituted.[38]

The scale adopted—the science and technology degree productivity unit (S&T DP)—refers to the baccalaureate degree in science and engineering as the base. This bachelor's degree was assigned the base value of *one*. The final numerical assignments, accordingly, are 2.2 S&T DP units for the doctor of veterinary medicine, 2.5 for the master's degree in science and technology, 4.0 for the doctor of medicine and the doctor of dentistry, and 4.5 for the doctor of science and engineering.

Comparative Measures (Indices) of Institutional Productivity and Federal Influence

To place the academic institution in proper perspective with respect to productivity in higher education, with particular reference to the sciences, requires an appraisal of its contributions to the national specialized manpower pool. Absolute data on size, productivity, and affluence only partly satisfy the requirements for such an appraisal, for they give no clear measure of an institution's relative (comparative) position in the academic-scientific community. In order to compare the resource utilization and productivity characteristics of one institution to those of another, and in order to consider their comparative contributions and potential, yardsticks are required in the form of ratios and/or indices. Only in a comparative sense will it be possible to give meaning to an institution's contribution to the Nation's trained manpower pool, especially to the graduate and advanced levels of science and technology.

The most obvious and simplest measurement to derive is an index that measures an institution's comparative contribution in graduate education. To fulfill this requirement it is just necessary to construct a ratio that includes the terms denoting gradute and total enrollment.

Re, the graduate education index,[39] is, accordingly, a measure of an institution's comparative contribution or the extent to which it contributes or participates in graduate education in comparison to its total educational potential. It is defined as the ratio of graduate student enrollment (GE) to total enrollment (TE); $\mathrm{R}e = \mathrm{GE}/\mathrm{TE}$.

There is also a need to know to what extent an institution contributes or participates in science education. A meaningful index can be constructed that relates total productivity (quantity) in science education to total enrollment (potential). Again total enrollment is used as a measure of an institution's total educational capability. The weighted productivity measure of education in the sciences (S&T DP) appears to satisfy the manpower output requirement in science and technology, for it is an integrated expression of the various levels of degrees granted in the sciences.

$\mathrm{R}s$, the science education index,[40] is, accordingly, a measure of an institution's comparative contribution (the allocation of educational resources) to education in the sciences. It is defined as the ratio of an institution's total educational output in science and technology education (S&T DP) to its total educational potential in terms of enrollment (TE); $\mathrm{R}s = (\mathrm{S\&T\ DP})/\mathrm{TE}$.

With respect to a measurement of the impact or influence of Federal funds on the academic institution, two alternatives exist. One is a comparison of Federal funds to total institution obligations or income, and the other is a comparison of Federal funds to an institution's productivity in science and technology.

As with the derivation of $\mathrm{R}e$, so with the derivation of an expression that measures impact in terms of monies. An expression embodying both total institutional income (EGI + FFAS) and Federal impact (FFAS) seems to contain the basic ingredients that satisfy the requirements for ascertaining the force of the Federal impact on the totality of institution fiscal obligations or contributions to higher education.

$\mathrm{R}fe$, the impact index (total income)[41] is, accordingly, a measure of the impact or relative weight of Federal funds in terms of an institution's total income according to the following ratio: Federal funds for academic science (FFAS) to the institution's income (EGI + FFAS); $\mathrm{R}fe = \mathrm{FFAS}/(\mathrm{EGI} + \mathrm{FFAS})$.

The constraints inherent in the expression $\mathrm{R}fe$ (the expression EGI + FFAS in the true sense is not a measure of institution size or its intellectual contribution or participation in higher education) encourage the exploration of other comparative systems of measuring the influence of Federal funds on the academic institution. Unfortunately, the only other index possible at this time is the one that is based on an institution's total educational contribution in science and technology. An expression that contains the terms Federal funds and educational output in science and technology can be fashioned. Federal funds, as with the index R*s*, again is made to serve as one leg of the expression. The science and technology degree productivity unit (S&T DP) appears to satisfy the requirement for the institution's output in science education.

R*fd*, the other impact index (science education),[43] is, accordingly, a measure of Federal impact or contributions to the institution's educational productivity in science and technology. It is defined as the ratio of Federal funds (FFAS) to the academic institution's educational productivity (output) in science and technology (S&T DP); R*fd* = FFAS/(S&T DP).

The constraints inherent in the R indices (see Footnotes 39 to 43) are elaborated to show that there is an element of softness in the measures proposed, and also to focus attention on the constraints themselves. The intent is to encourage further sharpening of definitions and concepts and the attainment of fuller coverage of educational and research funding statistics. It is even now possible to sharpen the R indices, especially R*e* and R*s*. R*e* can be modified to reflect more precisely both the total number of students enrolled and those enrolled in graduate study. Full-time student or full-time-equivalent statistics can be substituted. R*s* can be retained as is, or modified to reflect more precisely the institution's contributions to graduate education in the sciences. By introducing more precise values for cost of education into the derivation of S&T DP, it and the derived R*s* and R*fe* can be sharpened to become more meaningful and representative of the resources and forces being quantified.

These measuring devices can be made more specific and precise, and others can be fashioned but only if the base of the data bank is broadened and if more reliability is built into the academic science and higher education statistics.

VI. THE ACADEMIC INSTITUTION AND ITS RESOURCES

The Universe of Higher Education

The system of higher education in the United States in the academic year 1962–1963 consisted of 2,136 institutions, divided into 1,442 degree-granting and 694 junior colleges (Table 1). This system enrolled 4.4 million students, of whom 375,000 were committed to graduate studies. In the same academic year the system produced 134,000 graduates with bachelor's degrees, 27,000 with master's degrees, and 7,970 with doctorates in science and engineering (Table 2). It also produced 820 veterinarians, 3,180 dentists, and 7,270 doctors of medicine.

The 1,442 degree-granting institutions further subdivided into 1,257 accredited and 185 nonaccredited institutions. Of the 1,257 accredited degree-granting institutions, 1,063 constituted the academic institution population selected for this study.

The study population of 1,063 institutions included 50 percent of all the institutions of higher learning and 74 percent of the degree-granting institutions in the United States. This study group enrolled 3.4 million degree-registered students in academic year 1962–1963 (Table 1), excluding correspondence students, and 370,000 in graduate studies—78 percent of the students enrolled in higher education, 96 percent of those in accredited degree-granting institutions, and 99 percent of all the graduate students enrolled. These same institutions accounted for 99 percent of all the bachelor's and master's degrees awarded in science and engineering in the year studied (Table 2), and practically all the doctorates. They further accounted for all the veterinarian and dental degrees awarded, and 95 percent of all the degrees in medicine.

Only 1,866 bachelor's (1.5 percent) and 267 master's degrees (1.0 percent) granted in science and engineering in the academic year studied were excluded. The individuals represented by these degrees were principally the graduates of proprietary and military institutions, such as the General Motors Institute, the U.S. Military Academy or the U.S. Naval Postgraduate School. Since these institutions are fiscally self-sufficient, their educational product in no way effects the study objectives.

Table 1.—*Enrollment and Degrees Granted by All U.S. Institutions of Higher Education in Academic Year 1962–1963*

	Number of Institutions	Enrollment	
		Total	Graduate Degrees
All Institutions of Higher Education ..	2,136	4,400,030	375,118
Degree-Granting	1,442	3,585,110	375,118
Accredited, included in study	1,063	3,425,456	369,964
Accredited, excluded from study	194	83,213	4,506
Nonaccredited, excluded from study	185	76,441	648
Non-Degree-Granting (excluded from study) ..	694	815,190	0
Accredited	410	–	–
Nonaccredited	284	–	–
PERCENT			
Degree-Granting—Percent of all Higher Education	67.5	81.5	100.0
Accredited, included in study:			
Percent of degree-granting	73.7	95.6	98.6
Percent of all higher education	49.7	77.8	98.6
Accredited, excluded from study:			
Percent of degree-granting	13.5	2.3	1.2
Percent of all higher education	9.1	1.9	1.2
Nonaccredited, excluded from study:			
Percent of degree-granting	12.8	2.1	0.2
Percent of all higher education	8.7	1.7	0.2
Non-Degree-Granting (excluded from study) ..	32.5	18.5	0
Accredited—Percent of non-degree-granting ..	59.1	–	–
Nonaccredited—Percent of non-degree-granting	40.9	–	–

Table 2.—*Total Degrees Granted in Science and Technology in the United States in Academic Year 1962–1963*

	BA	MA	PhD	DVM	MD	DDS
Accredited institutions included in study	132,436	26,761	7,963	823	6,873	3,181
Percent of total	*98.6*	*99.0*	*100.0*	*100.0*	*94.6*	*100.0*
Accredited institutions excluded from study	1,866	267	2	0	392	0
Percent of total	*1.3*	*1.0*	*0*	*0*	*5.4*	*0*
Nonaccredited institutions excluded from study	63	0	0	0	0	0
Percent of total	*0.1*	*0*	*0*	*0*	*0*	*0*
Total	134,365	27,028	7,965	823	7,265	3,181

A Profile of the Degree-Accredited Institutions

The study population is made up of 169 Class A institutions, 197 Class B, 651 Class C, and 46 Class D (Table 3). With respect to legal control, the population consists of 229 private, 354 public, and 480 denominational institutions.

Class C institutions are the most numerous. They make up 61.3 percent of the population of accredited degree-granting institutions. Class B, the next most numerous, accounted for 18.5 percent; Class A, 15.9 percent; and Class D, the smallest group, 4.3 percent. Class D institutions by definition are those institutions granting no degrees in science or technology.

The Class A institutions enrolled the bulk of the Nation's degree-registered students. They accounted for 1.7 million students—49.7 percent of all the students in the study population. Class A institutions also enrolled the bulk of the graduate student population; they accounted for 264,000—71.3 percent of all the graduate students.

Class A institutions are by far the largest institutions; their average enrollment is 10,100 students. They are also the largest in terms of average graduate enrollment (1,600 graduate students).

Class A institutions further participate to the highest degree in graduate education. The R*e* value (graduate education index) for Class A institutions is 0.155. Class C institutions, as is to be expected, contributed the least in graduate education— R*e* is 0.027.

Table 3.—Enrollment and Degrees Granted in Science and Technology by Class and Control in 1063 Degree-Accredited Universities and Colleges in Academic Year 1962–1963

BY CLASS

	Number Institutions	Enrollment										
		Total	Graduate	R_e[2]	S&T DP[3]	BA	MA	PhD	DVM	MD	DDS	R_s[4]
TOTAL	1,063	3,425,456	369,964	*0.108*	277,149	132,436	26,761	7,963	823	6,873	3,181	*0.081*
Average		3,222	348		261	125	25	7	1	6	3	
Percent[1]	*100.0*	*100.0*	*100.0*		*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	
Class A	169	1,701,687	263,699	*0.155*	206,533	71,528	22,902	7,963	814	6,873	3,181	*0.121*
Average		10,069	1,560		1,222	423	136	47	5	41	19	
Percent[1]	*15.9*	*49.7*	*71.3*		*74.5*	*54.0*	*85.6*	*100.0*	*98.9*	*100.0*	*100.0*	
Class B	197	875,843	81,372	*0.093*	38,967	29,259	3,859	—	9	—	—	*0.044*
Average		4,446	413		198	149	20	0	—	0	0	
Percent[1]	*18.5*	*25.5*	*22.0*		*14.1*	*22.1*	*14.4*	*0*	*1.1*	*0*	*0*	
Class C	651	804,718	22,060	*0.027*	31,649	31,649	0	0	0	0	0	*0.039*
Average		1,236	34		49	49	0	0	0	0	0	
Percent[1]	*61.3*	*23.5*	*5.9*		*11.4*	*23.9*	*0*	*0*	*0*	*0*	*0*	
Class D	46	43,208	2,833	*0.066*	0	0	0	0	0	0	0	*0.000*
Average		939	62		0	0	0	0	0	0	0	
Percent[1]	*4.3*	*1.3*	*0.8*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	

BY CONTROL

	Number Institutions	Enrollment										
		Total	Graduate	R_e[2]	S&T DP[3]	BA	MA	PhD	DVM	MD	DDS	R_s[4]
Denominational	480	659,965	39,212	*0.059*	39,084	27,035	1,776	257	0	885	724	*0.059*
Average		1,375	82		81	56	4	1	0	2	2	
Percent[1]	*45.2*	*19.3*	*10.6*		*14.1*	*20.4*	*6.6*	*3.2*	*0*	*12.9*	*22.8*	
Private	229	708,368	115,048	*0.162*	79,995	31,543	8,674	3,015	107	2,310	924	*0.113*
Average		3,093	502		349	138	38	13	—	10	4	
Percent[1]	*21.5*	*20.6*	*31.1*		*28.9*	*23.8*	*32.4*	*37.9*	*13.0*	*33.6*	*29.0*	
Public	354	2,057,123	215,704	*0.105*	158,070	73,858	16,311	4,691	716	3,678	1,533	*0.077*
Average		5,811	609		447	209	46	13	2	10	4	
Percent[1]	*33.3*	*60.1*	*58.3*		*57.0*	*55.8*	*61.0*	*58.9*	*87.0*	*53.5*	*48.2*	

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[1] Percent detail may not add to 100 because of rounding.

[2] R_e = Graduates student enrollment/total enrollment.

[3] S&T DP = Science and Technology Degree Productivity.

[4] R_s = Science and technology degree productivity/total enrollment.

Denominationally controlled, accredited, degree-granting institutions are the most numerous. These institutions number 480, and they constitute 45.2 percent of the study group. Privately controlled institutions are the least numerous; they make up 21.5 percent of the total studied.

The publicly controlled institutions enrolled the largest proportion of the degree-registered student body—2.1 million students, 60.1 percent of the total student study population. The remaining 40 percent of the student study group is about equally divided—19.3 percent were enrolled at denominational and 20.6 percent at private institutions.

Publicly controlled institutions also enrolled most of the graduate student population—216,000 (58.3 percent). The denominationally controlled institutions, on the other hand, enrolled only 10.6 percent of the total graduate population.

With respect to size, as measured by total enrollment, the publicly controlled institutions stand first. On the average they enrolled about 5,800 students per institution, about twice the number enrolled by the average private institution (3,100) and more than four times the number enrolled by the average denominational institution (1,400). The public institutions also are largest when measured in terms of graduate enrollment. But here the difference between private institutions and public is not as large as is the case with total enrollment. Public institutions average about 600 graduate students per institution, while privately controlled institutions average about 500. The denominational institutions average about 80 graduate students per institution.

Public institutions contribute most to the Nation's graduate student pool (58.3 percent). Private institutions, however, had the largest proportion of students enrolled in graduate education ($Re = 0.162$). The denominational institutions fall far behind both—10.6 percent of the Nation's graduate pool and a rather small effort in graduate education ($Re = 0.059$).

Class A institutions accounted for 74. 5 percent of the Nation's total educational productivity in science and technology in the academic year 1962–1963—207,000 S&T DP units. Class B and C institutions accounted for 14.1 percent and 11.4 percent, respectively. Class D institutions by definition are noncontributors to the science and technology degree pool.

Class A institutions awarded 54.0 percent of all the bachelor's degrees, 85.6 percent of the master's degrees, and all the doctorates in science and engineering. They also granted all the doctor of medicine degrees in the study population, all those in dentistry, and 99 percent of the degrees in veterinary medicine. Class B institutions awarded 22.1 percent of the bachelor's and 14.4 percent of the master's degrees in the sciences. Class C institutions, as per definition, awarded only baccalaureates in science and engineering—23.9 percent.

Class A institutions contributed more of their own educational effort to science and technology than did any other class of institution. The R*s* value (science education index) for Class A institutions is 0.121; for Class B, 0.044; and for Class C, 0.039.

Public institutions were the major contributors to the Nation's educational pool in science and technology (158,000 S&T DP units, 57.0 percent of the total) in academic year 1962–1963. Private institutions contributed about one-half this effort—28.9 percent—and the denominational institutions, the least—14.1 percent.

Public institutions awarded the bulk of the bachelor's degrees in science and engineering in the year studied, 55.8 percent; of the master's degrees, 61.0 percent; and of the doctorates, 58.9 percent. Public institutions also graduated 87.0 percent of the veterinarians, 53.5 percent of the doctors of medicine, and 48.2 percent of the doctors of dentistry. Although denominational institutions are the most numerous (480), they contributed the least to education in the sciences. They accounted for only 14.1 percent of the degree units produced in science education. Their contribution to graduate education in science and engineering was also the lowest; they accounted for 3.2 percent of the doctorates in science and engineering. The R*s* value for denominational institutions (0.059) is also quite low when compared to a R*s* of 0.113 for private, and 0.077 for public institutions.

Class A *public* institutions appear to carry the brunt of the Nation's load in higher education; they also carry the heaviest load in education in the sciences (Tables C–1, C–2). Class A public institutions enrolled 33 percent of all the degree-registered students and 38.9 percent of all the enrolled graduate students. They accounted for 45.8 percent of all the science and technology degree units (S&T DP) produced in the year studied. They awarded 36.8 percent of the bachelor's degrees in science and engineering, 52.1 percent of the master's, and 58.9 percent of the doctorates. They also accounted for 87 percent of the veterinarians trained, 53.5 percent of the doctors of medicine, and 48.2 percent of the doctors of dentistry.

But it is the Class A *private* institution that scored highest in the graduate education index—R*e* = 0.236. This same type of institution was also the largest participant in education in the sciences as demonstrated by a science education index (R*s*) of 0.154. These two values can be interpreted to mean that of the Nation's institutions of higher learning, Class A private institutions are the most highly committed (in terms of their total educational potential) to graduate education and to education in science and technology.

Class B, C, and D institutions totaled 894; they make up about 85 percent of the degree-accredited institutions. They were, for the most part, not as deeply involved in science education as were the Class A institutions. They enrolled 50 percent of the total degree-listed students but accounted for only about 25 percent of the total S&T DP units. They did, however, contribute 46 percent of the bachelors in science and engineering.

The R*s* value (science education index) of 0.026 for Class C public institutions is the lowest of all institution types studied, indicating a low order of association with science education.

The Economics of Higher Education

There were 19 institutions that reported academic budgets in excess of $40 million (Table 4). These 19 institutions enrolled 13.0 percent of all degree-registered students in the study population and 24.8 percent of the students enrolled in graduate training. They also accounted for 24.1 percent of the educational productivity in science and technology (67,000 S&T DP units). They budgeted 23.9 percent of all the funds committed to higher education (educational and general income).

There were 179 academic institutions—17 percent of the study population—with budgets in excess of $5 million. These institutions accounted for $3.13 billion or 72 percent of the total academic income. They enrolled 60 percent of the total student body and 81 percent of the graduate population. They accounted for 78 percent of the Nation's educational contribution to science and technology (215,000 S&T DP units) for the year studied. They awarded 62 percent of the bachelor's degrees in science and engineering, 89 percent of the master's, and 98 percent of all the doctorates.

The remaining 884 institutions, those with academic budgets of less than $5 million, comprise 83 percent of the institution study population. They enrolled 40 percent of the total student body, but only 19 percent of the graduate population. They accounted for 28 percent of the total academic budget, and they produced 38 percent of the bachelors in science and engineering.

Table 4.—Enrollment and Degrees Granted in the Sciences of Academic Institutions, Rank Ordered by the Educational and General Income, Academic Year 1962–1963

[dollars in thousands]

Level of Educational and General Income (EGI)	Number	EGI[2]	Enrollment		S&T DP[3]	BA	MA	PhD	R_e[4]	R_s[5]
			Total	Graduate						
Total	1,063	$4,346,393	3,425,456	369,964	277,149	132,436	26,761	7,963	0.108	0.081
Average		4,089	3,222	348	261	125	25	7		
Percent[1]	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*		
Above $40 Million	19	1,040,195	446,340	91,595	66,893	20,482	8,116	3,386	0.205	0.150
Average		54,747	23,492	4,821	3,521	1,078	427	178		
Percent[1]	*1.8*	*23.9*	*13.0*	*24.8*	*24.1*	*15.5*	*30.3*	*42.5*		
$20–$40 Million	28	750,107	452,999	66,882	49,269	16,722	5,284	2,093	0.148	0.109
Average		26,790	16,179	2,389	1,760	597	189	75		
Percent[1]	*2.6*	*17.3*	*13.2*	*18.1*	*17.8*	*12.6*	*19.7*	*26.3*		
$10–$20 Million	52	762,914	598,773	75,250	54,413	23,615	5,542	1,479	0.126	0.091
Average		14,671	11,515	1,447	1,046	454	107	28		
Percent[1]	*4.9*	*17.6*	*17.5*	*20.3*	*19.6*	*17.8*	*20.7*	*18.6*		
$5–$10 Million	80	576,754	545,101	66,161	44,406	21,270	4,951	831	0.121	0.081
Average		7,209	6,814	827	555	266	62	10		
Percent[1]	*7.5*	*13.3*	*15.9*	*17.9*	*16.0*	*16.1*	*18.5*	*10.4*		
$1–$5 Million	469	969,998	1,091,741	64,908	51,487	39,986	2,829	172	0.059	0.047
Average		2,068	2,328	138	110	85	6	0.4		
Percent[1]	*44.2*	*22.3*	*31.9*	*17.5*	*18.6*	*30.2*	*10.6*	*2.2*		
Under $1 Million		246,425	290,502	5,168	10,681	10,361	39	2	0.018	0.037
Average	415	594	700	13	26	25	—	—		
Percent[1]	*39.0*	*5.7*	*8.5*	*1.4*	*3.9*	*7.8*	*0.1*	—		

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[1] Percent detail may not add to 100 because of rounding.

[2] EGI = Educational and General Income.

[3] S&T DP = Science and Technology Degree Productivity.

[4] R_e = Graduate student enrollment/total enrollment.

[5] R_s = Science and technology degree productivity/total enrollment.

For a better understanding of the economics of higher education the academic budget was examined in terms of three measures of institutional concern with higher education—total enrollment (Figure 1), graduate enrollment (Figure 2), and science education (Figure 3). The scatter diagrams are representative of the Class A institutions only (169), and so are the least squares regression lines; the class interval points represent the means of the 1,063 universities and colleges (Table 4). These averages are rank ordered by the educational and general income. (A few of the individual institution points at the upper levels of funding were not included for graphic-representational reasons.)

The correlation coefficient for the relationship total enrollment to the academic budget—TE = 3400 + 390 (EGI in millions)—is 0.79. Sixty-three percent of the variations in the total enrollment data for Class A institutions can be accounted for by this expression.

The correlation coefficient for the relationship graduate enrollment to the academic budget—GE = 200 + 80 (EGI in millions)—is 0.75. Fifty-six percent of the variation in graduate enrollment for Class A institutions can be accounted for by the expression above.

The correlation coefficient for the relationship education productivity in the sciences to the academic budget—S&T DP = 210 + 60 (EGI in millions)—is estimated to be 0.90. Eighty

Figure 1.—The Relationship of Total Enrollment to the Educational and General Income for Class A Institutions

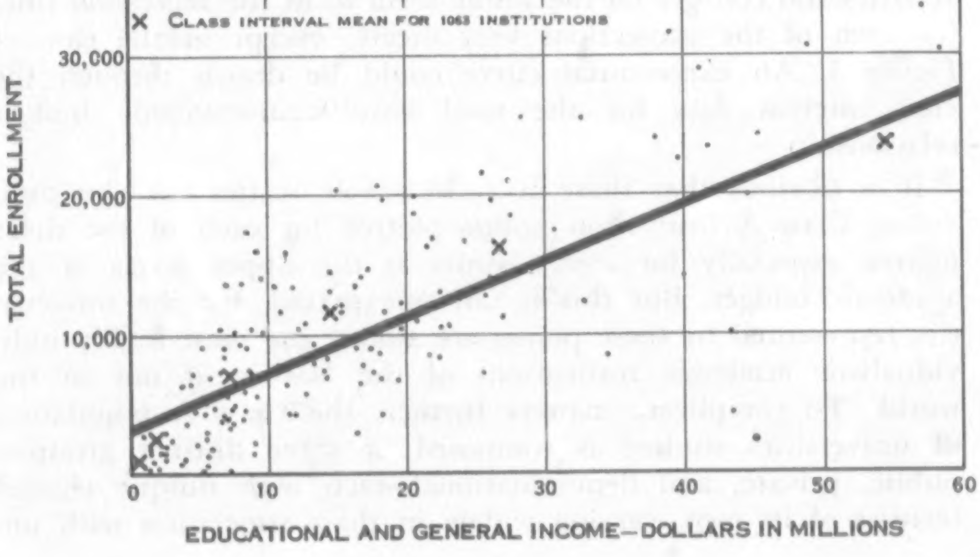
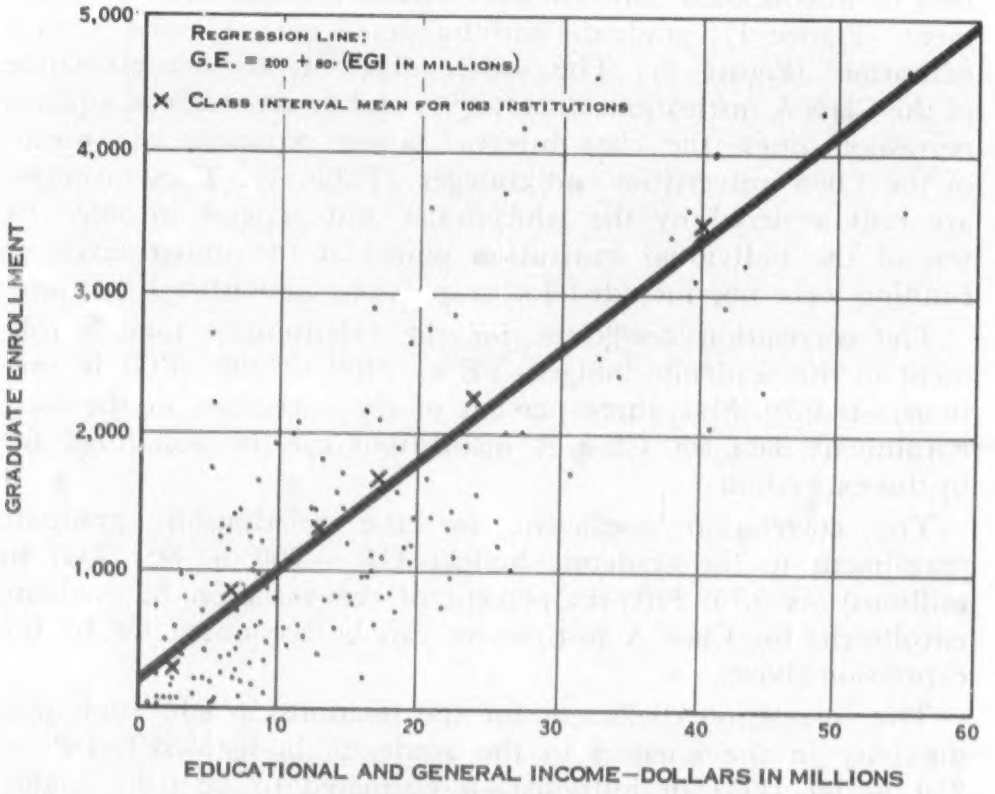


Figure 2.—*The Relationship of Graduate Enrollment to the Educational and General Income for Class A Institutions*

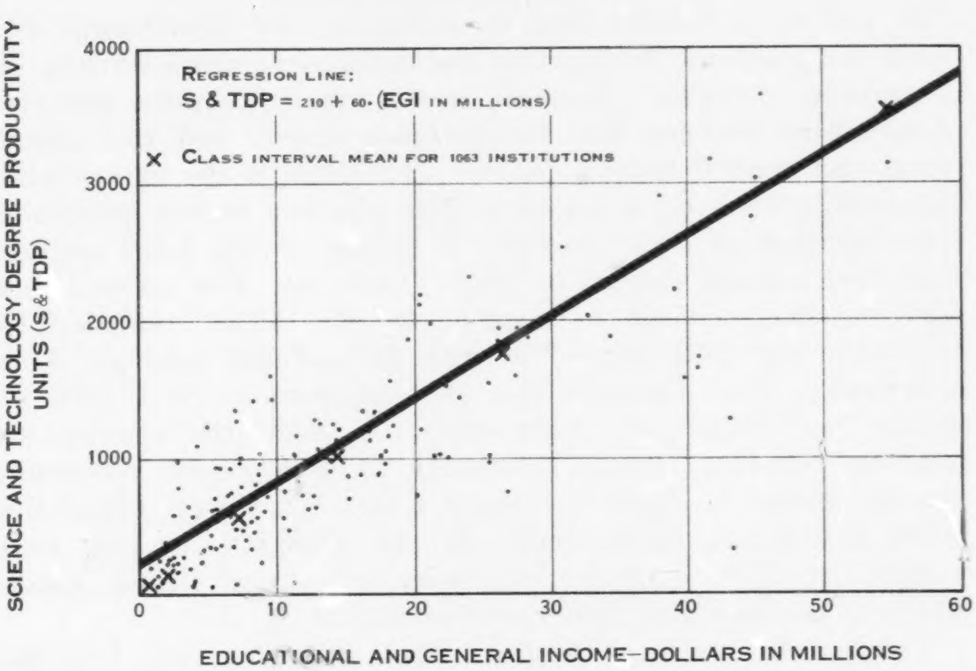


percent of the variations in degree productivity units for Class A institutions can be accounted for by the S&T DP expression.

Although each of the correlation coefficients are within acceptable limits, the S&T DP-EGI relationship shows up best. The class interval data means for the total population of universities and colleges on the whole seem to fit the regression lines for each of the projections very nicely, except in the case of Figure 1. An exponential curve could be drawn through the class interval data for the total enrollment-academic budget relationship.

It is obvious that there is considerable scatter for the individual Class A institution points plotted for each of the three figures, especially for those points at the upper levels of the academic budget. But this is not unexpected, for the universities represented by these points are among the most highly individualistic academic institutions of the Nation, if not in the world. To complicate matters further, the Class A population of universities studied is composed of three distinct groups—public, private, and denominational—each with unique characteristics of its own, varying widely in their association with un-

Figure 3.—The Relationship of Science and Technology Degree Productivity to the Educational and General Income for Class A Institutions



dergraduate, graduate, and science education and scientific research. The total enrollment data also complicate matters because of the inclusion of the part-time element, and to make matters still worse, the educational and general income data are not always compatible with expenditure. It is truly remarkable that the correlations turned out as well as they did. It is also not surprising that the correlation coefficient for the degree productivity unit relationship to the academic budget turned out better than the others. The S&T DP metric was introduced in the hope of establishing an integrated measure, at least indicative of total educational productivity in the sciences.

No inference is intended that the institutional budget is influenced primarily by any one or all three variables investigated. An educational institution's business is much too complex for such simple deductions. However, the interpretation can be made that the relationships showing the highest correlations may be more reflective of the principal business of an academic institution, and consequently may serve as a measure of its level and degree of commitment to education or its economic needs. The data plotted in Figure 1 leave it unclear whether the EGI-TE relationship is exponential or linear. However, this is not the place to argue this point, since both EGI and TE data contain elements of uncertainty. At any rate, all three relationships relating the academic budget to enrollment characteristics and educational productivity are sufficiently interesting to warrant further study of these and related phenomena.

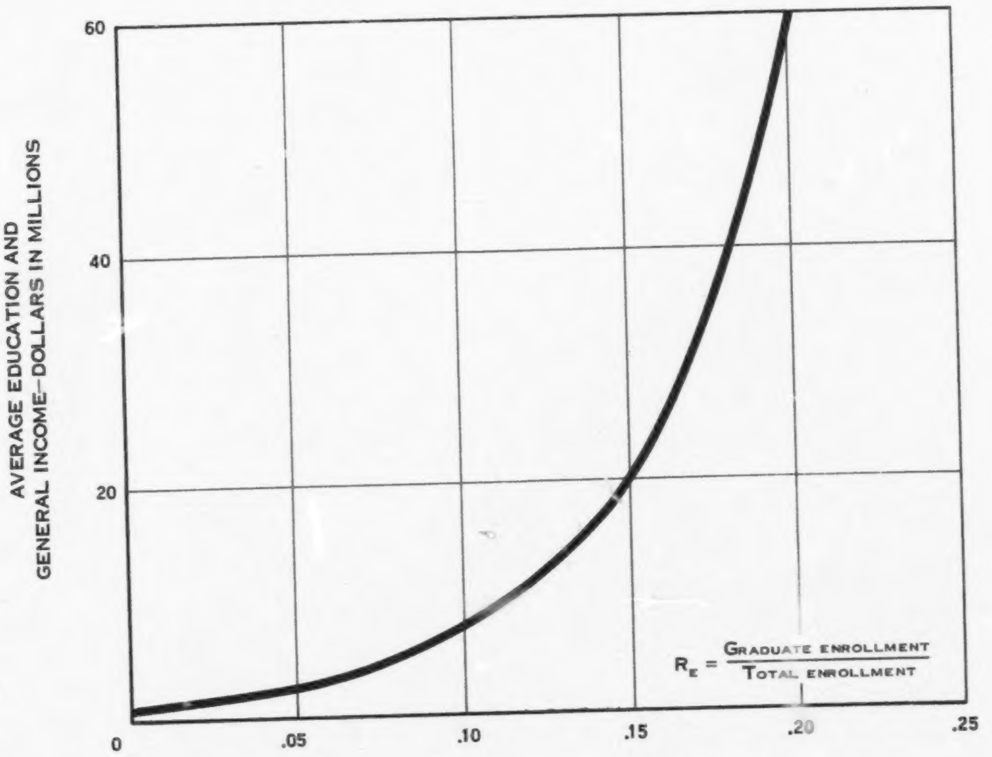
In seeking a further understanding of the relationship between the academic budget and the enrollment characteristics of institutions of higher education, it was logical to probe into the relationships between R*e*, the graduate index, and the educational and general budget (EGI). The result is the exponential relationship depicted in Figure 4. The plot is a slightly smoothed representation of the class interval means of the 1,063 universities and colleges ranked by EGI (Table 4). The curve has a relatively sharp change in slope at the R*e* values between 0.10 and 0.15, and EGI values between $7 and $20 million. This unorthodox plot[43] indicates that there appears to be a level in institutional enrollment characteristics, wherein the institution's funding behavior changes markedly. The level of maximum rate of change in slope for Figure 4 falls somewhere below the 100th institution rank-ordered by the academic budget, well within the Class A group of institutions—those clearly associated with graduate and professional education.

Two conclusions may be drawn from this plot: (1) that the funding-educational dynamics of the first 100 institutions (ranked by size, budget, graduate program, etc.) are quite different from the other 1,000, and (2) that total enrollment is not the principal force or the only measure in education dynamics determinative of fiscal requirements. There is the likelihood that estimates based on total enrollment data may even yield erroneous answers if used to ascertain the fiscal needs of institutions heavily committed to graduate and advanced education. The evidence makes it appear more than likely that, at some value level in R*e*—the graduate index—it is the graduate phase of higher education that is principally determinative of education budget policy; that at some critical level in an institution's evolution (from emphasis on undergraduate education to increasing identity with graduate studies), it faces a radical and major policy change in fiscal practices. Certainly the evidence in Figure 4 militates against the use of total enrollment as a measure or as the principal factor in setting budget policy of the larger more affluent institutions.

If the evidence submitted (Figures 1, 2, 3, 4) and the chain of reasoning developed is admissible, one may tentatively make further interpretations. For it appears that once institutions embark on programs of advanced education they seem to require about $12 million in educational and general income for every 1,000 graduate students enrolled. This relationship seems to be independent of the size of the total student body at some critical enrollment level. One can go one step further by speculating that institutions engaged in science education appear to require about $17 million in the educational and general income for every 1,000 S&T DP units committed to education in the sciences. Neither of these figures is to be interpreted strictly, of course. The educational and general income is a function of a number of institutional activities other than graduate education and education in the sciences. But as a first approximation to an understanding of educational dynamics and economics, these numbers do give one an order of magnitude and a rule of thumb with respect to the requirements and the costs of graduate education and education in science and technology.

It appears that the fiscal behavior of colleges and universities is size dependent. However, at the more advanced levels of higher education, it seems that graduate, professional, and science education are the more likely determinants of the academic

Figure 4.—The Relationship of the Educational and General Income for Universities and Colleges to the Graduate Education Index (*Re*)



budget. It also appears that the universities (Class A institutions) are the major producers of trained manpower, especially at the professional and graduate levels, and that it is these same institutions that train the bulk of the Nation's scientists and technologists, especially at the graduate and professional degree levels. (Class A institutions are expected to dominate the educational picture with respect to the award of doctorates in science and engineering, the doctor of medicine, and the doctor of dentistry because of definitional constraints.) It further appears that the universities are the major generators and users of academic funds. A fairly direct relationship seems to exist between academic funding and institutional contribution to science education, and between funding and institutional effort in graduate education.

VII. PATTERNS OF FEDERAL FUNDS FOR ACADEMIC SCIENCE

Distribution by Agency

Thirteen Federal agencies obligated $1.10 billion for academic science in fiscal year 1963 (Tables 5 and 6, A–1, A–2, C–3). They were the U.S. Public Health Service–$500 million (45.4 percent); the National Science Foundation–$227 million (20.7 percent); The Department of Defense–$199 million (18.1 percent); the Atomic Energy Commission–$62 million (5.7 percent); the National Aeronautics and Space Administration–$42 million (3.8 percent); the U.S. Department of Agriculture–$42 million (3.8 percent); the U.S. Office of Education–$20 million (1.8 percent); and six "Others"–$7 million (0.7 percent).

The data can be considered to be fairly reliable (Table C–4)." The reported total for Federal funds for academic science is about 17 percent higher than the total reported for Federal funds for research and development to colleges and universities proper. This difference is about right, for about 20 percent of Federal funds for academic science are for the science education component.

To put this study in proper perspective, and to provide a point of reference, the following statistics dealing with Federal support are noted. In fiscal year 1963, the total Federal research and development budget for colleges and universities proper was $850 million. In the same year, total Federal obligations for research and development to colleges and universities (including contract research centers) came to $1,500 million. Federal obligations for total research and development totalled $12,500 million and the total Federal budget (net) $94,700 million. In fiscal year 1963 Federal funds for academic science obligations amounted to about 9 percent of the total research and development budget and 1.2 percent of the total Federal budget.

The obligated $1.10 billion in Federal funds for academic science went to 711 institutions out of a population of 1,063 accredited, degree-granting universities and colleges in the United States. These 711 institutions received a total of $5.15 billion (EGI + FFAS) in the same year, comprised of $4.05 billion in educational and general income and $1.10 billion in

Federal funds for academic science. Federal funds for academic science contributed 21.4 percent (R*fe*) to the total research and education budget of the 711 institutions in the study population receiving Federal funds.

The United States Public Health Service contributed $500 million or 45.4 percent of the total Federal support to academic science in fiscal year 1963. The U.S. Public Health Service ranked first among the Federal agencies supporting academic science. Its support was approximately twice the size of the next highest contributor to academic science—the National Science Foundation. The Foundation contributed $227 million, 20.7 percent of the total. The Department of Defense followed with $199 million, 18.1 percent. These three agencies contributed 84.2 percent of the total—$926 million; ten others contributed 15.8 percent.

Federal Funds by Institution Class and Control

In fiscal year 1963 $1.05 billion was obligated to 169 Class A institutions (Tables 5, C–3). These institutions received 95.1 percent of the total Federal academic science funds; 46.6 percent of this came from the U.S. Public Health Service. The National Science Foundation and Department of Defense followed with 18.8 and 18.4 percent respectively. The three-agency total equaled 83.8 percent of the $1.05 billion obligated to Class A institutions.

Class B institutions, numbering 197, received $37 million or 3.4 percent of the total; 53.5 percent came from the NSF. The USPHS contributed 21.5 percent, the DOD 15.6 percent. The remaining 9.4 percent was distributed among the other ten agencies.

Class C institutions, numbering 651, received $16 million or 1.5 percent of the total. The NSF contributed the bulk of the Federal support to this class—70.2 percent; the USPHS contributed 20.4 percent.

Private institutions, numbering 229, received $485 million in Federal funds for academic science. This group accounted for 44.1 percent of the total. They received their principal support from the USPHS, which accounted for $222 million or 45.9 percent of the funds obligated to this private group of institutions. The Department of Defense contributed the next largest amount, 22.8 percent; it was followed by the NSF with an additional 18.8 percent.

Public institutions, numbering 354, received $547 million in FFAS; they accounted for 49.8 percent of the total. They also

Table 5.—Federal Funds for Academic Science by Agency, by Class, and Control of Institution, Fiscal Year 1963

[dollars in thousands]

BY CLASS

	Number	FFAS[2]	EGI[3]	DOD	NASA	AEC	USPHS	NSF	USOE	USDA	Other	R_{fe}[4]	R_{fd}[5]
TOTAL	1,063	$1,099,481	$4,346,393	$199,400	$42,122	$62,244	$499,527	$227,323	$19,680	$41,697	$7,488	*0.202*	3,967
Average		1,034	4,089	188	40	59	470	214	19	39	7		
Percent[1]		*100.0*		*18.1*	*3.8*	*5.7*	*45.4*	*20.7*	*1.8*	*3.7*	*0.7*		
Class A	169	1,045,622	2,864,882	192,616	41,542	61,268	488,097	195,828	18,120	40,901	7,250	*0.267*	5,063
Average		6,187	16,952	1,140	246	363	2,888	1,159	107	242	43		
Percent[1]		*100.0*		*18.4*	*4.0*	*5.9*	*46.6*	*18.8*	*1.7*	*3.9*	*0.7*		
Class B	197	37,359	725,791	5,833	428	730	8,062	19,982	1,324	796	204	*0.049*	959
Average		190	3,684	30	2	4	41	101	7	4	1		
Percent[1]		*100.0*		*15.6*	*1.1*	*2.0*	*21.5*	*53.5*	*3.6*	*2.1*	*0.5*		
Class C	651	16,306	714,038	909	152	246	3,325	11,449	191	—	34	*0.022*	515
Average		25	1,097	1	—	—	5	18	—	—	—		
Percent[1]		*100.0*		*5.6*	*0.9*	*1.5*	*20.4*	*70.2*	*1.2*	*0.0*	*0.2*		
Class D	46	194	41,682	42	—	—	43	64	45	—	—	*0.005*	—
Average		4	906	1	—	—	1	1	1	—	—		
Percent[1]		*100.0*		*21.7*	*0.0*	*0.0*	*22.1*	*33.0*	*23.2*	*0.0*	*0.0*		

BY CONTROL

	Number	FFAS[2]	EGI[3]	DOD	NASA	AEC	USPHS	NSF	USOE	USDA	Other	R_{fe}[4]	R_{fd}[5]
Denominational	480	$67,148	$618,519	$9,636	$1,524	$1,068	$41,180	$12,909	$778	—	$53	*0.098*	1,718
Average		140	1,289	20	3	2	86	27	2	—	—		
Percent[1]		*100.0*		*14.4*	*2.2*	*1.6*	*61.4*	*19.2*	*1.1*	*0.0*	*0.1*		
Private	229	484,848	1,189,532	110,577	20,783	29,834	222,446	91,238	6,574	963	2,433	*0.290*	6,061
Average		2,117	5,194	483	91	130	971	398	29	4	11		
Percent[1]		*100.0*		*22.8*	*4.3*	*6.1*	*45.9*	*18.8*	*1.3*	*0.2*	*0.5*		
Public	354	547,485	2,538,342	79,187	19,815	31,342	235,901	123,176	12,328	40,734	5,002	*0.177*	3,464
Average		1,547	7,170	224	56	89	666	348	35	115	14		
Percent[1]		*100.0*		*14.5*	*3.6*	*5.7*	*43.1*	*22.5*	*2.2*	*7.5*	*0.9*		

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[1] Percent detail may not add to 100 because of rounding.

[2] FFAS = Federal Funds for Academic Science.

[3] EGI = Educational and General Income.

[4] R_{fe} = Federal funds for academic science/total institutional income.

[5] R_{fd} = Federal funds for academic science/science and technology degree productivity.

Table 6.—Federal Support of Academic Science by Agency, Ordered by Level of Federal Funds for Academic Science, Fiscal Year 1963

[dollars in thousands]

Level of Federal Funds for Academic Science Received by Institutions	Number of Institutions	Federal Funds for Academic Science	Educational & General Income	DOD	NASA	AEC	USPHS	NSF	USOE	USDA	Other	R_{fe}[2]	R_{fd}[3]
Above $20,000 . . .	14	$394,143	$715,955	$98,282	$12,824	$24,666	$171,119	$76,051	$4,255	$4,135	$2,811	*0.355*	7,895
Average		28,153	51,140	7,020	916	1,762	12,223	5,432	304	295	201		
Percent[1]		*100.0*		*25.0*	*3.2*	*6.3*	*43.4*	*19.3*	*1.0*	*1.1*	*0.7*		
$10,000–$20,000 . .	15	208,676	481,073	37,056	9,923	13,285	103,221	37,186	2,724	4,148	1,133	*0.303*	6,651
Average		13,912	32,072	2,470	662	886	6,881	2,479	182	277	76		
Percent[1]		*100.0*		*17.7*	*4.8*	*6.4*	*49.4*	*17.8*	*1.3*	*2.0*	*0.5*		
$5,000–$10,000 . . .	31	223,082	701,513	25,493	7,832	11,352	118,960	40,571	4,849	13,682	1,243	*0.241*	4,496
Average		7,196	22,629	822	253	366	3,808	1,309	156	441	40		
Percent[1]		*100.0*		*11.5*	*3.5*	*5.0*	*53.0*	*18.1*	*2.2*	*6.1*	*0.6*		
$500–$5,000	106	233,293	1,011,939	36,738	11,093	12,115	98,315	46,767	6,368	19,677	2,200	*0.187*	2,984
Average		2,201	9,547	347	105	114	928	441	60	186	21		
Percent[1]		*100.0*		*15.7*	*4.8*	*5.2*	*42.1*	*20.0*	*2.7*	*8.4*	*0.9*		
$100–$500	129	28,881	506,162	1,597	426	643	6,520	18,276	1,269	55	95	*0.054*	1,023
Average		224	3,924	12	3	5	51	142	10	—	1		
Percent[1]		*100.0*		*5.5*	*1.5*	*2.2*	*22.6*	*63.3*	*4.4*	*0.2*	*0.3*		
$1–$100	416	11,406	631,668	234	24	185	2,292	8,472	195	0	6	*0.018*	387
Average		27	1,518	1	—	—	6	20	0	0	—		
Percent[1]		*100.0*		*2.1*	*0.2*	*1.6*	*20.1*	*74.3*	*1.7*	*0*	—		
No Federal Funds	352	0	298,083	—	—	—	—	—	—	—	—	—	—
Average		0	847	—	—	—	—	—	—	—	—		
Percent[1]		*0*		*0*	*0*	*0*	*0*	*0*	*0*	*0*	*0*		
TOTAL	1,063	$1,099,481	$4,346,393	$199,400	$42,122	$62,244	$499,527	$227,323	$19,680	$41,697	$7,488	*0.202*	3,967
Average		1,034	4,089	188	40	59	470	214	19	39	7		
Percent[1]		*100.0*		*18.1*	*3.8*	*5.7*	*45.4*	*20.7*	*1.8*	*3.8*	*0.7*		

[1] Percent detail may not add to 100 because of rounding.

[2] R_{fe} = Federal funds for academic science/total institutional income.

[3] R_{fd} = Federal funds for academic science/science and technology degree productivity.

received their principal support from the USPHS, amounting to $236 million or 43.1 percent of the obligated FFAS. Three agencies—the USPHS, DOD and NSF—accounted for 80.1 percent of the funds obligated to public institutions. The U.S. Department of Agriculture contributed 98 percent of its academic science funds to this one group.

Denominational institutions, numbering 480, received $67 million in Federal funds for academic science, equivalent to 6.1 percent of the total. These institutions also received their principal support (61.4 percent) from the USPHS.

Federal Funds by Level of Support

Fourteen institutions received in excess of $20 million per institution. These 14 received a total of $394 million or 35.8 percent of the total Federal funds (Table C–5). The USPHS contributed 43.4 percent of the funds received by this group of 14 (Table 6); the DOD, 25.0 percent; the NSF, 19.3 percent. The other ten agencies shared the remaining 12.3 percent.

An additional 15 institutions received sums ranging between $10 million and $20 million, a total of $209 million or 19.0 percent of the whole.

One hundred twenty-nine institutions received between $100,000 and $500,000 in FFAS, for a total of $28.9 million or 2.6 percent of the whole. The NSF contribution amounted to 63.3 percent of the total; the USPHS, 22.6 percent; and the DOD, 5.5 percent.

Four hundred sixteen degree-accredited institutions received between $1,000 and $100,000 in Federal funds, for a total of $11.4 million. The National Science Foundation contributed 74.3 percent and the U.S. Public Health Service 20.1 percent.

The first 29 institutions ranked by Federal funds received sums in excess of $10 million—a total of $603 million or 54.8 percent of the total obligated.

The first 166 institutions rank-ordered by Federal funds received in excess of $500,000 per institution, a total of $1.06 billion or 96.3 percent of the total funds obligated.

Five hundred forty-five institutions received a total of $40.3 million in Federal funds (3.7 percent of the total obligated) ranging from $1,000 to $500,000.

Three hundred fifty-two institutions, 33.1 percent of the degree-accredited institutions, received no Federal funds for academic science.

Federal Funds and Multiple Support of Academic Science

As stated in the preceding section, 352 institutions received no Federal funds for academic science. An additional 332 institutions received support from one agency only, and 151 institutions received support from two only (Table 7). The rest, numbering 228, received support from at least three agencies. Of these, 113 institutions received some support from at least six, and of this last group, 31 received support from all eight (the "Other" category counts as one). These same 113 institutions, as one might expect, are those that rank the highest by level of Federal funds.

These results indicate that the institutions at the higher end of the academic science support spectrum have not become one-agency dependent for their Federal support. The more affluent and major producers of advanced education scientists and technologists tend to be found at the upper end of the rank spectrum; they also appear to be the major beneficiaries of pluralistic support. They appear to have a wide latitude of choice respecting source of support and to be the beneficiaries of a broadly based, multiple support system.

But multiple support *per se* is not of great consequence, unless considered in conjunction with the size and the order of magnitude of the total and principal support. For although the universities and colleges receiving the major share of Federal funds receive this support from the largest number of Federal agencies, basically, their principal and major support for academic science comes from one Federal agency. The U.S. Public Health Service not only is the principal source of funds for Federal academic science (45.4 percent of all FFAS), it is also the principal Federal influence in the first 150 institutions rank ordered by Federal funds (Table C–6). It is the major Federal influence in all but ten of the first 50 institutions (rank ordered between $6.3 million and $42.5 million in Federal funds). Similarly, it is also the major influence in the next 50 institutions.

The National Science Foundation is an important influence from about the 150th institution—those institutions whose upper limit of FFAS support is about $2.7 million. It is the major force in the support of academic science throughout the remainder of the study population. The Foundation's influence upon the less affluent universities and colleges is very great as contrasted with the influence of the other Federal agencies on this same segment of higher education. These institutions, however, lie at the lower level of the Federal support spectrum.

Table 7.—*Frequency With Which Academic Institutions Receive Multiple Support From Funds for Science by Federal Agencies*

Support	Number Institutions	Support By Only	Number Institutions
By All 8 Agencies[1]	31	DOD	2
By Any 7 Agencies	51	NASA	0
By Any 6 Agencies	31	AEC	3
By Any 5 Agencies	28	USPHS	51
By Any 4 Agencies	28	NSF	272
By Any 3 Agencies	59	USOE	4
By Any 2 Agencies	151	USDA	0
		OTHER[2]	0
		NONE	352

[1] OTHER is counted as one agency, accordingly, ALL refers to eight and not thirteen.

[2] OTHER includes six agencies: Department of Interior, Commerce, Labor, and State, Tennessee Valley Authority, and Veterans' Administration.

All agencies, with the exception of the National Science Foundation and the Office of Education, obligated more than 95 percent of their fiscal year 1963 appropriations for academic science to Class A institutions (Table C–3). The Foundation obligated 86.1 percent of its appropriation to Class A, 8.8 percent to Class B, and 5.1 percent to Class C. The USOE obligated 92.1 percent of its academic science funds to Class A and 6.7 percent to Class B, but its total obligation for academic science for the year under study was only $19.7 million.

Of the 711 universities and colleges receiving Federal funds for academic science in fiscal year 1963, the NSF supported 648 institutions—91 percent of the Federally supported and 61 percent of the degree-accredited institutions (Table C–7). The U.S. Public Health Service made financial support available to 398 institutions, to 56 percent of the support-receiving population and 37 percent of the study population. The U.S. Office of Education and the Department of Defense followed with 186 and 185 institutions, respectively. The U.S. Department of Agriculture limited its support to 57 institutions. The Department of Defense record is not complete for the DOD did not report institution obligation data of less than $10,000.

The National Science Foundation is the sole source of Federal support for the largest number of universities and colleges in this study population of 711 institutions. It singly supports 272 institutions (Table 7). The other Federal agencies combined are single support factors in 60 other cases. In almost every case where total Federal support comes from a single agency, the sum is usually of a low order of magnitude and under these circumstances single agency support is about all that can reasonably be expected. The single agency support issue, therefore, loses its significance.

The data suggest that Federal funds for academic science reach a rather wide population of universities and colleges, more than 700, although the bulk of these funds (95 percent) is obligated to the Class A institutions (universities). A large number of institutions (30 percent), principally of the Class B and C types, receive no Federal support. The data further suggest that the U.S. Public Health Service is the dominant force (45 percent) in Federal programming for academic science, at least in terms of the level of Federal support. The data also suggest that the National Science Foundation is the agency most broadly based in its support practices, reaching 90 percent of the institutions receiving Federal support.

It seems that the funding practices of the Federal agencies are sufficiently broad and pluralistic to make it possible for the major recipients of Federal funds—the larger and more affluent institutions—to have a wide latitude of choice respecting the source of Federal support. However, although the system of Federal support is essentially pluralistic, in that 13 Federal agencies support academic science, one agency supplies the major funding (45.4 percent). It further follows that only 20 percent of the Federal support for academic science comes from those agencies whose principal role is strengthening academic science and higher education. Therefore, although institutions appear to have a wide latitude of choice respecting sources of Federal support, such sources of support to a very large degree are restricted to agencies that support science in fulfillment of specific objectives, and the motivation, if not the orientation of the science supported, tends to become problem-solving—in the national interest sense—in nature.

VIII. THE IMPACT OF FEDERAL FUNDS ON THE ACADEMIC INSTITUTION

The Academic Budget and Federal Funds

The relationship between Federal funds for academic science and the educational and general income for Class A institutions (Figure 5) appears to be linear. The class interval mean points (Tables C–8, C–9) for all 1,063 universities and colleges, rank ordered by the educational and general income, appear to fit rather nicely on the least squares regression line. The correlation coefficient for the relationship—FFAS = 140 + 360 (EGI in millions)—is 0.74. Fifty-five percent of the variation in Federal funds can be accounted for by the expression above. (A few points representative of those institutions at the upper levels of funding again were excluded for reasons of convenience.)

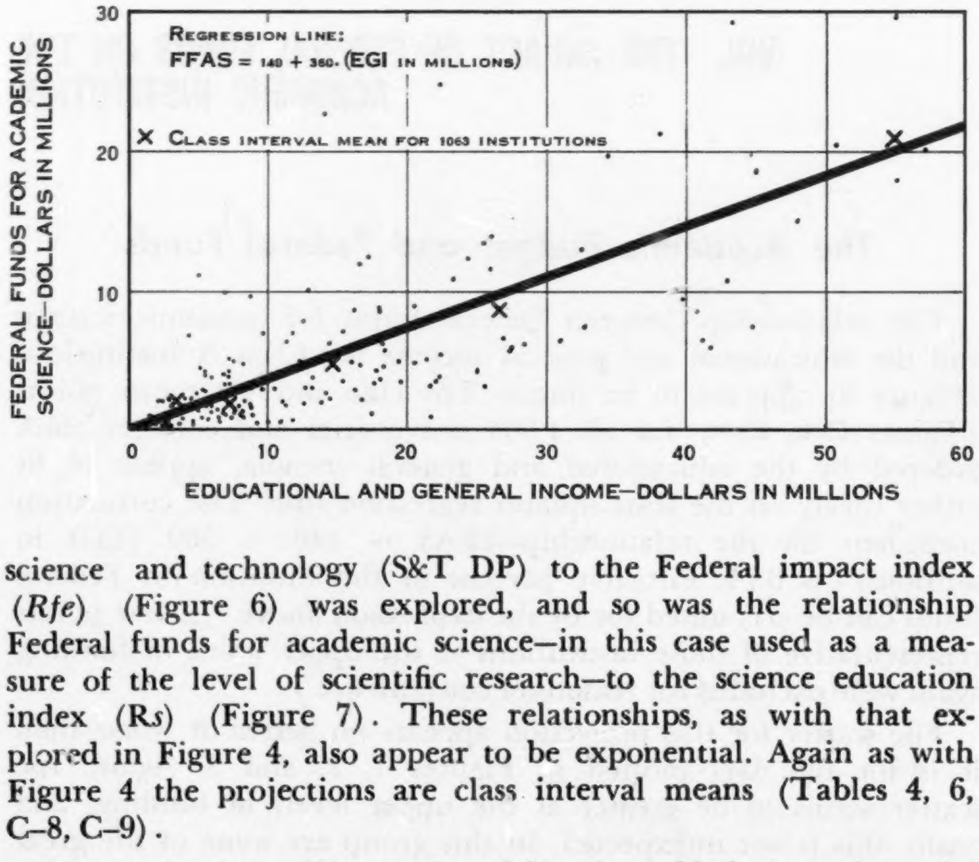
The scatter for this projection appears no better or worse than it is for the data plotted in Figures 1, 2, and 3. Again, the scatter seems to be greater at the upper levels of funding, and again, this is not unexpected. In this group are some of the great institutes of science and technology and a number of the great universities, many of which seem to be heavily committed to medical education, and all of which, highly dependent on Federal funds. This dependence in some few cases is at a sufficiently high level where the Federal funds component surpasses the income raised from all other sources.

At any rate, the relationship FFAS to EGI appears to be fundamentally linear. The slope of the line seems to indicate that in fiscal year 1963 the universities raised approximately $4 million in Federal funds for academic science for every $10 million they raised in educational and general income.

Federal Funds and Productivity in Science Education

To explore further the educational dynamics of universities and colleges, the methodology used in investigating the relationship educational budget to graduate index (Figure 4) was once again employed. The relationship of educational productivity in

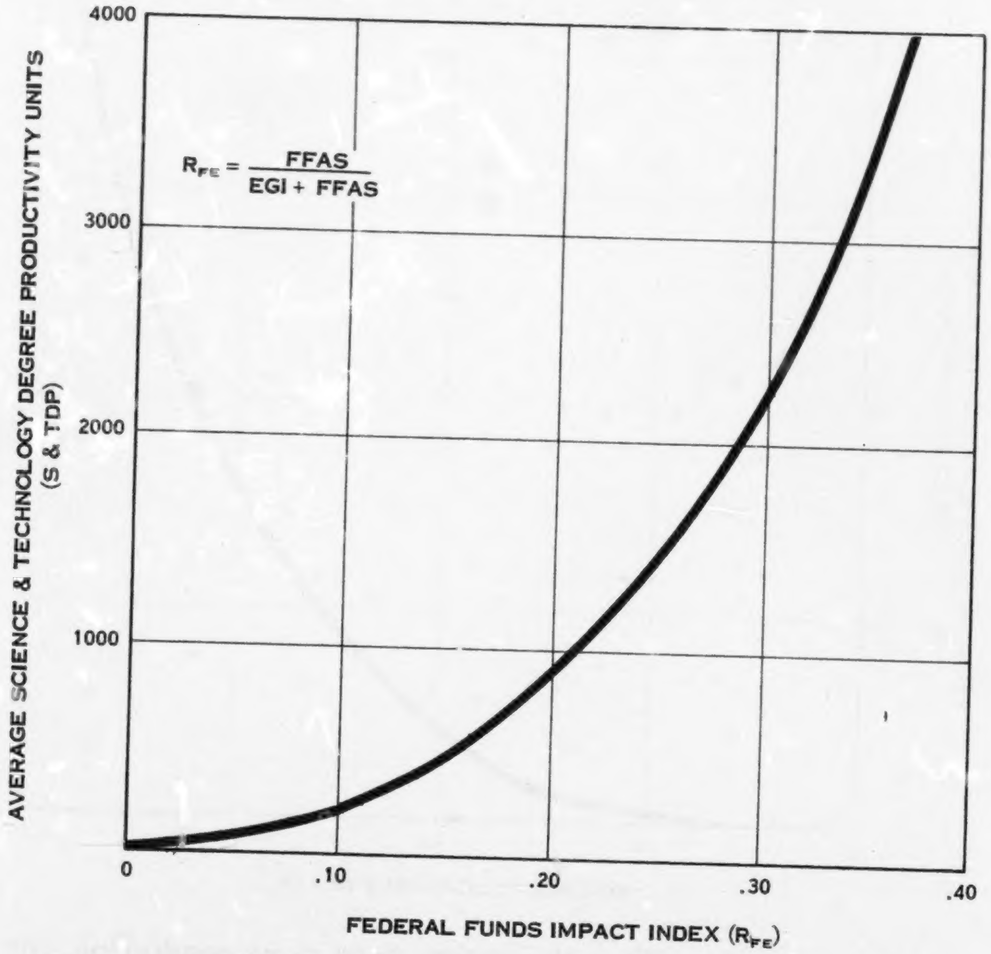
Figure 5.—The Relationship of Federal Funds for Academic Science to the Educational and General Income for Class A Institutions



science and technology (S&T DP) to the Federal impact index (*Rfe*) (Figure 6) was explored, and so was the relationship Federal funds for academic science—in this case used as a measure of the level of scientific research—to the science education index (R*s*) (Figure 7). These relationships, as with that explored in Figure 4, also appear to be exponential. Again as with Figure 4 the projections are class interval means (Tables 4, 6, C–8, C–9).

The projections (Figures 6 and 7) give added strength to the hypothesis advanced in section VI that in terms of the budgeting-educational characteristics of institutions, they appear to fall into at least two distinct groups. The inference was drawn that the group at the higher end of the budget-enrollment spectrum (Figure 4), appeared to be heavily committed to graduate education. The data plotted in Figures 6 and 7 allow the continuation of this hypothesis and the additional inference that these institutions—at the higher end of the (graduate) education-affluence scale—are those more closely identified with research and science education, especially at the graduate and professional levels. It is quite obvious that there are a large number of institutions that fall between these two extremes. They pose the question: Are they in a state of equilibrium[2] part way between undergraduate and graduate education, or are they in the process of leaving the one and moving into the other? The methodology (Figures 4, 6, 7) appears to offer a mode for further exploring the phenomena of the changing, evolving academic institution of higher educa-

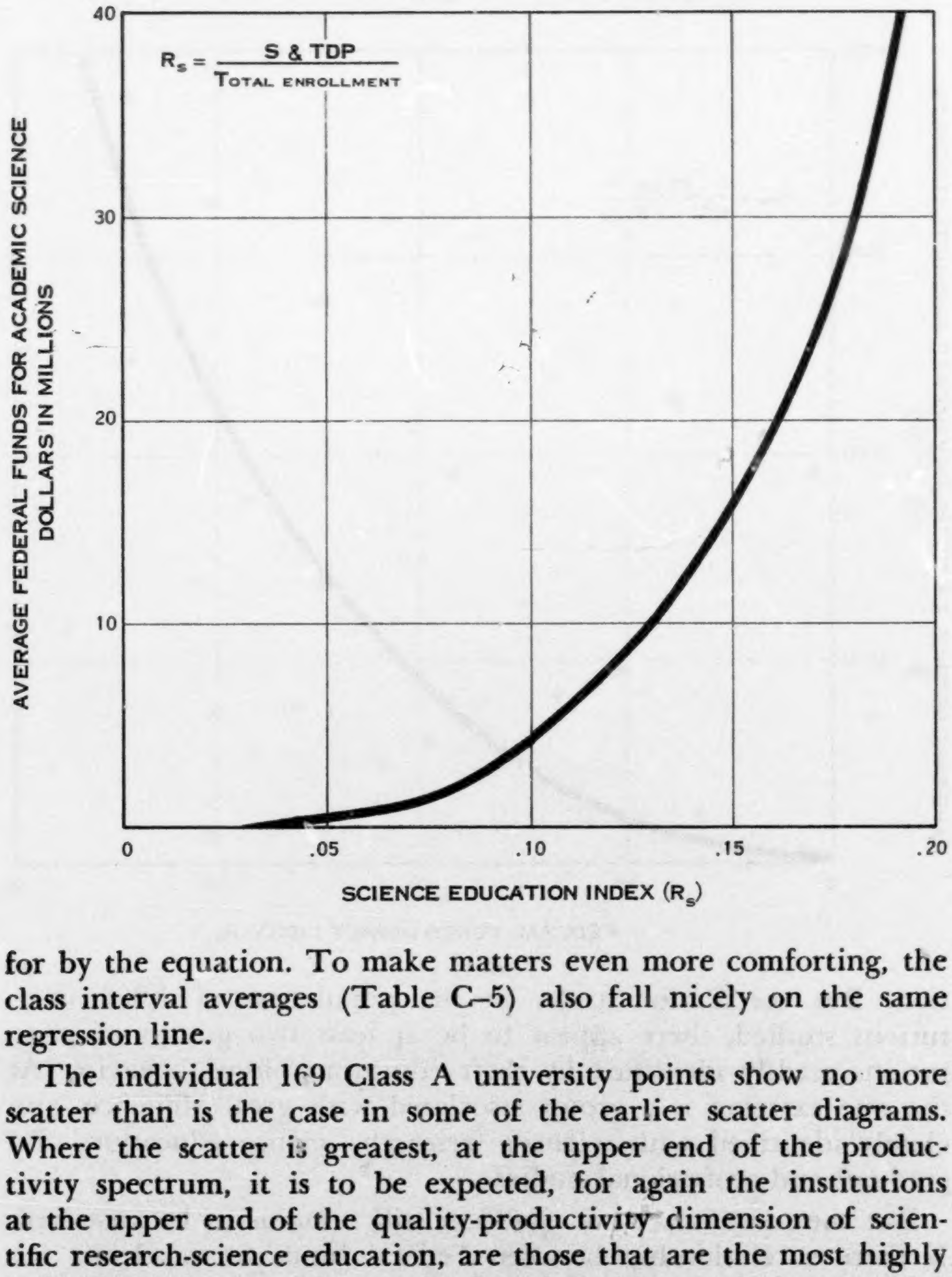
Figure 6.—The Relationship of Degree Productivity in Science and Technology in Universities and Colleges to the Federal Funds For Academic Science Impact Index (*Rfe*)



tion. But speculation aside, in the population of 1,063 institutions studied, there appear to be at least two groups of institutions readily identified by their educational-fiscal behavior. At the one extreme is a group associated with great affluence, and closely identified with scientific research, science education, and graduate and professional studies.

But the most important question still remains to be answered. Is there a relationship between Federal funds for academic science and the academic institution's output in science education? It seems that there is—at least at the advanced degree level. The relationship between Federal funds and doctoral degrees awarded in science and engineering appears to be linear (Figure 8). The correlation coefficient for the relationship—S&E PhD's = 5 + 7.0 (FFAS in millions)—is estimated as 0.85; seventy-three percent of the variations in doctoral degrees can be accounted

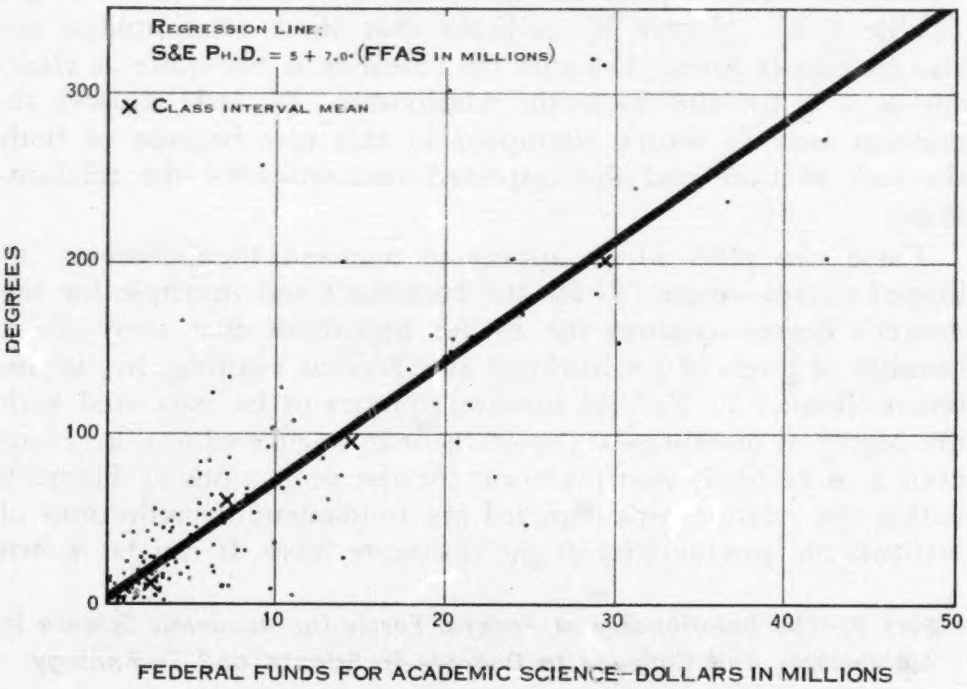
Figure 7.—The Relationship of Federal Funds for Academic Science in Universities and Colleges to the Science Education Index (Rs)



for by the equation. To make matters even more comforting, the class interval averages (Table C–5) also fall nicely on the same regression line.

The individual 169 Class A university points show no more scatter than is the case in some of the earlier scatter diagrams. Where the scatter is greatest, at the upper end of the productivity spectrum, it is to be expected, for again the institutions at the upper end of the quality-productivity dimension of scientific research-science education, are those that are the most highly individualistic. Considering the fact that this population contains a mixture of the great institutes of science and technology and a number of the great universities highly committed to medical research and education, the level of compatability—the correlation coefficient, 0.85—between degrees awarded and Federal funds is truly remarkable. It is also quite apparent that further investigation of this interesting relationship is in order.

Figure 8.—The Relationship of Science and Engineering Doctoral Degrees to Federal Funds for Academic Science for Class A Institutions



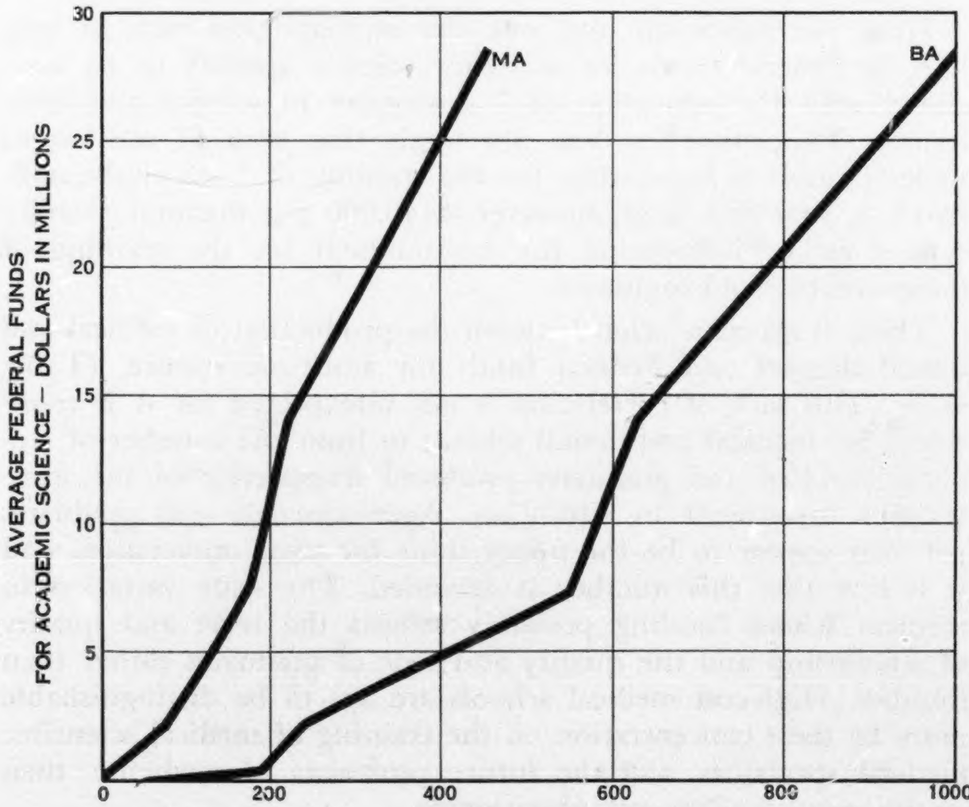
From the regression line, one can estimate that each $1 million in Federal funds for academic science appears to be associated with the education of 7 doctorates in science and technology. This inference does not imply that each $1 million in Federal funds is responsible for the training of 7 doctoral candidates. A sum this large, however—$140,000 per doctoral award—cannot escape influencing the environment for the training of these scientists and engineers.

There is no correlation between the production of medical and dental degrees and Federal funds for academic science (Table C–5). This lack of correlation is not unexpected for it is traditional for medical and dental schools to limit the number of students enrolled and graduates produced irrespective of the institution's investment in education. Approximately 150 graduates per year appear to be the upper limit for most universities, and it is rare that this number is exceeded. The wide variation in medical school funding probably reflects the level and quality of scholarship and the quality and type of graduates rather than number. High-cost medical schools are apt to be distinguishable more by their concentration on the training of medical scientists, medical specialists, and the future professors of medicine, than on the training of general practitioners.

The next question also naturally follows. What sort of relationships obtain for Federal funds and degree productivity in science and technology at the bachelor's and master's degree levels? The class interval plots for all 1,063 universities and colleges (Table C–5) (Figure 9) indicate that these relationships are also essentially linear, but that the linearity is not quite as clear-cut as it is for the doctorate relationship. (A least squares regression analysis wasn't attempted in this case because of both the lack of time and the suspected remoteness of the relationship.)

These two plots which appear to manifest themselves as "s" shaped curves–single "s" for the bachelor's and multiple for the master's degree–confirm the earlier hypothesis that there are a number of levels of institutional and Federal funding. In one instance (Figure 7) Federal funding appears to be associated with the degree of institutional involvement in science education. However, a more likely interpretation for the projections in Figure 9 is that the relationships depicted are fundamentally reflections of institutional productivity at the doctorate level. It can be shown

Figure 9.—*The Relationship of Federal Funds for Academic Science in Universities and Colleges to Degrees in Science and Technology*



that high doctorate producing institutions are apt to be those that are the high producers of the bachelor's and master's degrees (Table 3). This is especially true for the Class A public institutions where high doctorate productivity is associated with high productivity at both the bachelor's and master's degree levels. At any rate, the relationships depicted in Figure 9 leave room for considerable speculation and uncertainty, thus encouraging the further exploration of the relationships of Federal funds to educational productivity at all levels of science education.

The preceding evidence leads one to the following summary:

Federal funds for academic science appear to be directly proportional to:

1. institutional investment in education (EGI).
2. institutional commitment to graduate education.
3. institutional educational productivity in science and technology (S&T DP).
4. doctoral production in science and engineering.

One may also conclude that doctorate degree production and educational productivity in science and technology are closely allied to the quality and the level of scientific research, and that academic research and graduate education in science are different faces of the same coin. One may further conclude that graduate education in the sciences, especially at the doctorate level, exerts a profound effect on the academic institution's fiscal behavior.

Federal Funds and Institution Types

Class A institutions, numbering 169, received $1.05 billion—95.1 percent of all Federal funds for academic science (Tables 5, 8, C–3). The denominational component of Class A institutions, numbering 24, received $52 million—4.7 percent of the total; the private component, numbering 52, received $469 million—42.6 percent; and the public component, numbering 93, received $525 million—47.7 percent.

The public component of Class B, numbering 114 institutions, received the principal share (more than 50 percent) of the $37 million obligated to Class B. It received $19 million—51.1 percent of the class total, and 1.7 percent of the total Federal obligations.

Denominational institutions of the Class C component of institutions, numbering 404, received the major share of the funds obligated to Class C. But they received only $7.5 million to-

Table 8.—*Funding and Manpower Characteristics of Degree-Accredited Institutions by Class and Control*

[dollars in thousands]

Institutions	Number Institutions	FFAS	EGI	R_{fe}[1]	Enrollment		R_e[2]	Science and Engineering				R_s[4]
					Total	Graduate		S&T DP[3]	BA	MA	PhD	
All Institutions ...	1,063	$1,099,481	$4,346,393	0.202	3,425,456	369,964	0.108	277,149	132,436	26,761	7,963	0.081
Class A	169	1,045,622	2,864,882	.267	1,701,687	263,699	.155	206,533	71,528	22,902	7,963	.121
Denominational .	24	52,263	174,768	.230	157,928	22,016	.139	16,006	5,175	1,293	257	.101
Private	52	468,727	860,524	.353	413,830	97,627	.236	63,598	17,672	7,675	3,015	.154
Public	93	524,632	1,829,590	.223	1,129,929	144,056	.127	126,929	48,681	13,934	4,691	.112
Class B	197	37,359	725,791	.049	875,843	81,372	.093	38,967	29,259	3,859	—	.044
Denominational .	40	7,385	89,726	.076	115,010	11,991	.104	5,812	4,594	483	—	.051
Private	43	10,852	153,062	.066	129,631	13,158	.102	8,966	6,440	999	—	.069
Public	114	19,122	483,003	.038	631,202	56,223	.089	24,189	18,225	2,377	—	.038
Class C	651	16,306	714,038	.022	804,718	22,060	.027	31,649	31,649	—	—	.039
Denominational .	404	7,473	347,742	.021	381,602	5,157	.014	17,266	17,266	—	—	.045
Private	121	5,117	163,353	.030	156,331	3,749	.024	7,431	7,431	—	—	.048
Public	126	3,716	202,943	.018	266,785	13,154	.049	6,952	6,952	—	—	.026
Class D	46	194	41,682	.005	43,208	2,833	.066	—	—	—	—	—
Denominational .	12	27	6,283	.004	5,425	48	.009	—	—	—	—	—
Private	13	152	12,593	.012	8,576	514	.060	—	—	—	—	—
Public	21	15	22,806	.001	29,207	2,271	.078	—	—	—	—	—

[1] R_{fe} = FFAS/EGI + FFAS.

[2] R_e = Graduate Enrollment/Total Enrollment.

[3] S&T DP = Science and Technology Degree Productivity.

[4] R_s = S&T DP/Total Enrollment.

tally, 45.8 percent of Class C and 0.7 percent of the total Federal funds obligated.

Class A institutions received on the average, $6.2 million in Federal funds per institution; Class B averaged $190,000; Class C, $25,000; and Class D, $4,000.

Class A private and public institutions, together numbering 145, received the bulk of both Federal funds (90.3 percent) and the academic budget (61.9 percent). This group of 145 institutions also trained 96.8 percent of the doctorates in science and engineering, 87.1 percent of the doctors of medicine, and 77.2 percent of the doctors of dentistry.

Private Class A institutions are the most highly favored of the classes studied, with respect to the receipt of Federal funds. The R*fe* value for this group is 0.353, indicating that 35 percent of the group's *total income* comes from Federal funds for academic science. This private Class A group of institutions also made the largest contribution in terms of its total educational effort in graduate education. Its R*e* (graduate education index) value turned out to be 0.236 (R*e* for the study population is 0.108). Private Class A institutions also devoted more of their educational effort to science education than did any other group—the R*s* (science education index) value is 0.154; R*s* for the study population is 0.081.

Fourteen institutions, 1.3 percent of the study population, received in excess of $20 million per institution and enrolled 296,000 students of whom 65,000 were in graduate studies. The student body of these 14 institutions constituted 8.6 percent of the total student population studied and 17.6 percent of those graduate-enrolled (Table C–5). These same 14 institutions received 35.8 percent of the Federal funds. They accounted for 10.5 percent of the bachelors, 23.7 percent of the masters, and 36.2 percent of the doctorates produced in science and engineering. They also graduated 21.3 percent of the veterinarians, 18.0 percent of the doctors of medicine, and 14.1 percent of the doctors of dentistry. They accounted for 18.0 percent of the Nation's educational effort in science and technology.

One hundred sixty-six institutions received 96.3 percent of Federal funds; they enrolled 50.9 percent of the students in the study population and 72.5 percent of the graduate students. They accounted for 75.4 percent of the Nation's educational effort in science and technology. They graduated 55.6 percent of all bachelors in science and engineering, 87.7 percent of the masters, 98.9 percent of the doctorates, 98.9 percent of all the veterinarians, all the doctors of medicine in the study population, and 95.1 percent of the dentists.

Five hundred forty-five institutions, 51.3 percent of the degree-accredited institutions, received as little as $1,000 and not more than $500,000 in Federal funds. This group of 545 institutions received 3.7 percent of the total Federal funds obligated; they produced 1.1 percent of the doctorates in science and engineering; they enrolled 38.7 percent of all the degree-listed students, and 24.4 percent of those enrolled in graduate education. They accounted for 26.1 percent of the funds in the academic budget and for 20.8 percent of the Nation's effort in science education.

Seven hundred eleven degree-accredited institutions received all the Federal funds for academic science obligated in fiscal year 1963. They made up 66.9 percent of the institution population in the study. They produced all the doctorates and masters in science and engineering; they produced all but 7.7 percent of the baccalaureates in science and engineering, and all the doctors of medicine and dentistry and all the veterinarians. They accounted for 96.2 percent of the Nation's effort in science education and 93.1 percent of the academic budget.

Three hundred fifty-two institutions, 33.1 percent of the degree-accredited population, received no Federal funds. They enrolled 10.4 percent of the degree-registered students and 3.1 percent of those committed to graduate studies. They accounted for 6.9 percent of the academic budget and 3.8 percent of the Nation's training activities in the sciences.

Institutions with Major Dependence on Federal Funds

Twenty-two Class A institutions received 40 percent or more of their total income from Federal funds for academic science (R*fe* value in excess of 0.400) (Table C–10). These 22 institutions rank relatively high when ordered by level of Federal funds. One, the University of California at San Diego, appears to be an artifact, for it has not fully metamorphosed from a research-graduate education institution into a university. Three institutions are basically medical colleges—Hahnemann, Georgia, and South Carolina Medical College. Another three institutions have dominant medical schools—Yeshiva University, Baylor University, and Union College and University. The only other public institution in this group of 22 institutions is the University of Oklahoma, probably because its educational and general income is low in terms of that of its contemporaries.

Within this group of 22 there are 15 institutions engaged in medical education. Six are institutions of science and technology in the accepted sense. Eighteen are privately or denominationally controlled. The four publicly controlled institutions appear to be special cases—the University of California at San Diego because it is only now emerging as an educational institution, Georgia and South Carolina Medical Colleges because they are essentially medical schools, and the University of Oklahoma for the reasons cited earlier. In the group of 18 nonpublic institutions are a number of the great private universities of the Nation. Among these are practically all the Nation's quality academic institutions of science and technology.

These data lead to the conclusion that a not insignificant group of American universities has become heavily dependent on a system of funding whose objective is not principally the advancement of higher education. Among these institutions are a number of the great private universities and institutes of science and technology. It follows naturally to ask whether this level of funding (R*fe*) (Table C–10) is to continue and for how long, how many other institutions will join the list of the heavily dependent, and whether the Federal support practices responsible for this predicament are in the best interest of science and/or higher education?

This state of affairs has been developing for about 25 years. No one could have predicted that the bold OSRD experiment of the early 1940's would lead to a system of academic support that would become the principal source of income for a number of the Nation's major universities and a substantial source of income for its total system of higher education in the early 1960's. Although the Federal contribution to academic income continues to increase, there are distinct signs of change in funding practices. Within the last few years the base of Federal support to academic science has been broadened to include Institutional Base Grants, Graduate Facility, and University, Departmental, and College Science Development Grants, to mention but a few innovations. There has also been a quantum increase in direct support to higher education. The issues posed have brought about the reexamination of Federal programming policies and practices. The recent establishment of a standing Committee on Academic Science and Engineering within the Federal Council is a direct result of an increasing awareness in Government of the close ties between strength in academic science and the Nation's health and security. But, as is so obvious, the level of funding these new programs is far from adequate to effect the existing trends. A growing number of quality American universities are becoming more and more dependent on sources of support only indirectly associated with the training of scientists and the advancement of higher education.

In spite of the fact that the academic science support system has been both beneficial and enlightened, it will continue to require reexamination, even more intensively than is now the case. The method of Federal support to higher education—by indirect means and through funds obligated for problem solving in the national interest—is being subject to continuous examination at the Executive level of Government. So has the question of the growing dependence of an increasing number of the Nation's great academic institutions on academic science funds also been the subject of intense study at the Executive level. It has also been the subject of recent hearings held before the Daddario Committee. There Gerard Piel[45] testified so eloquently:

> Our universities deserve public support not as instruments of national purpose in the service of ends chosen by Government, but as vessels that cherish and enlarge the liberties of self-governing citizens.

To the student of Government-university relationships the resolution of these issues goes far beyond the question of how to fund science at universities and colleges. The question to be faced is the nature and level of Federal responsibilities to higher education. For stated in the President's words,

> The strength of the research and development program of the major agencies and hence their ability to meet national needs, depends heavily on the total strength of our university system.

IX. NONRECIPIENTS OF FEDERAL FUNDS

A Profile

In fiscal year 1963, 352 institutions received no Federal funds for academic science. They enrolled 354,000 students (Tables A-2, C-11).

All Class A institutions received some aid in the form of Federal funds. All but 18 institutions in Class B, 9 percent of the Class B population, received some Federal assistance. Two hundred ninety-six out of 651 Class C institutions, 45 percent of Class C and 28 percent of the total study group, received no Federal funds for academic science. Thirty-eight out of 46 Class D institutions also were without Federal aid.

The denominational institutions not receiving Federal funds for academic science numbered 207 or 43 percent of the denominationally controlled population and about 20 percent of the total degree-accredited population of institutions. Private institutions without Federal funds for academic science totalled 49 out of 229. There were also 96 public institutions, out of a total of 354 public, that received no Federal funds.

Although these nonrecipients of Federal funds (nonparticipants in Federal science programs) enrolled 11,600 graduate students, they awarded only 77 master's degrees in science and engineering, 0.3 percent of the Nation's science and engineering master's degrees for the year studied. They trained none of the doctorates in science and engineering. They awarded 10,000 bachelor's degrees in these same areas. The R*s* value for these nonrecipients is 0.029 (average R*s* for the degree-accredited population of institutions is 0.081), demonstrating a minor effort in science education. Their contribution to advanced science education was especially low.

Public institutions, 96 of them, make up 27 percent of the nonrecipient population. They accounted for 162,000 of the 354,000 students enrolled by the nonrecipients (46 percent), and 9,000 of the 12,000 students in graduate studies (75 percent). They accounted for 30 percent of the bachelor's degrees (2,900) produced in science and technology by the nonparticipants. Their R*s* value of 0.019 is the lowest value attained by the nonrecipient groups and the lowest attained by any class of institution studied. Since the 96 public institutions in this group of nonrecipients can be assumed to be teachers colleges whose graduates are likely to be primary and secondary school teachers (Class B and C public institutions are or were principally teachers colleges), the question that comes to mind is, how well prepared are the graduates with respect to following their elected teaching careers? For a complete lack of Federal funds for science can be indicative of a marginal-to-low quality reference with respect to science scholarship and science education.

The Class C institutions (296) dominate the population class of the nonrecipients. They constitute about 85 percent of the nonparticipating population and account for about 80 percent (278,000) of all students enrolled in this group. They also accounted for 6,600 graduate students—about half the total of the graduate students listed by the nonrecipient institutions. They trained 9,300 bachelors in science and engineering—again about 90 percent of the group's production. The Rs value is 0.033.

The denominational institutions (207) dominate the population of nonrecipients with respect to institutional control. They make up about 60 percent of the study population, and they accounted for (153,000) about 43 percent of the students registered in the nonparticipating institutions. They graduated 5,860 individuals with bachelor's degrees in science and engineering—58 percent of the first-degree population trained by the nonrecipients. The Rs value is 0.038.

Interpretation of Data

It appears that the vast number of the baccalaureates in science and engineering trained by the nonrecipient institutions, are the product of the denominational Class C institution—the liberal arts college with close ties to religious organizations. It has been suspected that the nonparticipating group of institutions is dominated by the denominational liberal arts colleges. The evidence supports this opinion. It comes rather as a surprise that these same institutions are also the major nonrecipient producers of the bachelor's degree in science and engineering.

The number of private Class C institutions (liberal arts colleges) among the nonrecipient group of institutions appears relatively small. Since the total number of private nonrecipient institutions does not exceed 50, the number of private Class C institutions must be even less. Interestingly, few if any, of the distinguished liberal arts colleges are to be found among this group of nonrecipients (Tables A–1, A–2). The majority of these highly regarded liberal arts colleges appear to more than hold their own, both as producers of the baccalaureate in science and engineering (their principal contribution to science education) and as recipients of Federal funds for academic science. They stand relatively high in the receipt of Federal funds when size and primary educational objectives are taken into consideration.

There are 416 institutions that received between $1,000 and $100,000 in Federal funds—a sum total of $11 million and an average of $27,000 per institution (Table C–5). These institutions awarded 27,000 bachelor's degrees in science and technology—20.3 percent of the total number awarded in the Nation in academic year 1962–1963. These institutions also awarded 3.6 percent of the master's degrees. Adding this group of 416 marginal participants in Federal science programs to the 352 nonparticipants makes for an unusually large number of the Nation's degree-accredited institutions, 768 in all, that are participating marginally or not at all in Federal science programs. Their combined productivity in science education amounts to 28 percent of the bachelor's and 4 percent of the master's degrees awarded, and constitutes a fairly significant part of the Nation's scientifically educated manpower exposed little, or not at all, to the benefits available from Federal programs in support of academic science. Quality-competitive Federal programs in support of academic science obviously are not the proper vehicles for bringing the advantages of Federal science programs to this group of individuals and institutions. If they are not, then where and what is the suitable course of action?

It appears from the evidence submitted that the nonparticipants in Federal programs for academic science are marginal-to-low quality institutions of science scholarship and science education. Considering their large number and the student potential, their contribution to the Nation's scientific and technological manpower pool, at whatever the educational level, is low—at least considerably lower than the contributions of the recipient institutions. The forces responsible for low productivity of scientific manpower and nonparticipation in Federal science programs cannot be ascertained by statistical methods of study. Such methods, however, can point out the soft spots in the Nation's system of higher education, and as in the case here, those of the degree-accredited institutions and those engaged in science education. Calling attention to the weaknesses in the education system is of value, if for no other reason than to provide a base for a more thorough investigation. But more than this, it allows the opportunity to search out the underlying cause for the failure—in this case—

of the nonrecipients to participate in Federal programs. It also makes possible the institution of suitable corrective measures, if required. It may turn out that scruples against Federal aid on the part of faculty and board of trustees, rather than marginal-quality scholarship, or disinterest on the part of the institution is at the core of the nonparticipation problem. Whatever the cause, the matter of nonparticipation and low productivity of scientific manpower among these 352 institutions warrants further investigation, especially since the number of students in training within them constitutes a substantial element of the Nation's scientific and technological manpower pool.

X. UNIVERSITIES AND COLLEGES ENROLLING NEGRO STUDENTS PREDOMINANTLY

A Profile

There were 69 degree-accredited institutions in the academic year 1962–1963 that enrolled Negro students predominantly (Table C–12). These 69 institutions listed 94,000 students. They accounted for 2.1 percent of the education budget of the study population; they received $5.3 million or 0.5 percent of the Federal funds for academic science.

They awarded 2,954 bachelor's degrees in science and engineering, 161 master's degrees, and 7 doctorates. They registered only 1.2 percent of the Nation's graduate population. Their participation in graduate studies (R*e* = 0.049) was considerably below the study population average of 0.108. Their contribution to education in the sciences (R*s*) again was below the national average; the R*s* value for the total study population is 0.081 for the predominantly Negro-enrolled institutions it is 0.048. Whereas they made up 7 percent of the institution study population and enrolled 2.7 percent of all the degree-listed students, they produced only 2.2 percent of the bachelors in science and engineering, 0.6 percent of the masters, 0.1 percent of the doctorates, 1.1 percent of the veterinarians, 1.4 percent of the doctors of medicine, and 2.2 percent of the dentists. The advanced degrees in science and technology are the contribution of one institution—Howard University.

The predominantly Negro-enrolled institution budgeted $960 per student—25 percent below the study average. For the degree-granting accredited institution, the average is $1,270 per enrolled student; for the nonparticipant in Federal science programs institutions, the average is $840 per student. The predominantly Negro-enrolled institution population, however, contains a fair number of high quality institutions and a number of participants in Federal science programs. Among these is Howard University. Without Howard the predominantly Negro-enrolled institution average drops to a level of $840. By excluding the other participants in Federal science programs (more than half the Negro-enrolled group), the average budgeted per student would fall far below the $840 level and considerably below the average budgeted by the 352 nonparticipant institutions. The ratio of Federal funds per degree unit (R*fd*) for the predominantly Negro-enrolled institution is $1,300; for the study population, the R*fd* value is $4,000. The ratio of Federal funds to the total institution income (R*f*e) for the Negro-enrolled institution is 0.055; for the study population, it is 0.202.

This evidence indicates that those institutions that enroll Negroes predominantly are considerably below the study average—in funding, both local and Federal, in terms of productivity in graduate education, and productivity in education in the sciences.

These averages would have been considerably lower had Howard University been excluded from the population of Negro-enrolled institutions. Howard University is fundamentally a public and a federally supported university. Without Howard University this study group of 69 institutions would have produced no doctorates in science and engineering, and no doctors of medicine or dentistry.[46]

Thirty institutions enrolling predominantly Negro students received no Federal funds for academic science. They enrolled about 25,000 degree-listed students and 45 graduate students. They turned out 591 bachelors in science and engineering. Their contribution to graduate education and to science education was especially low. The R*e* value for these 30 institutions is 0.002; the R*s* value is 0.024. Both these values are especially low, whether compared to the total population of 1,063 degree-accredited institutions or to the 352 nonrecipients.

Of the Federal funds for academic science obligated to institutions that enroll Negroes predominantly, 58.6 percent came from the National Science Foundation, and 33.8 percent came from the U.S. Public Health Service. Less than 8 percent came from the remaining 11 agencies.

Interpretation of Data

As a group, the academic institutions enrolling predominantly Negro students appear to be a poorly financed group, both with respect to Federal and non-Federal funding sources. Their contribution to graduate training and to training in the sciences is far below the national average. Both the level of Federal funds, and the ratios, indicative of level and contribution to the graduate and science manpower pool, point to the fact that on the whole a marginal to low state of science scholarship and/or higher education in the sciences may exist within these institutions. This evidence both confirms and complements the findings of Earl J. McGrath,[47] former Commissioner of Education. Although Dr. McGrath indicates that a number of these institutions rank with the best with respect to quality, he nonetheless draws a depressing picture with respect to the others:

> An objective review of the facts discloses, however, that a not inconsiderable number of Negro institutions now struggle along toward the rear of the academic procession. The scope and recency of the training of their faculties, the character and the level of their students' preparatory education, and under present conditions the prospects of improvement in some of these institutions are not reassuring, even to the most sympathetic observer.

These universities and colleges enrolling Negro students predominantly, up until very recently, have constituted the backbone of Negro higher education and perhaps the major source of Negro leadership in the South. Dr. McGrath's data indicate that in 1963 of the seniors in these institutions, just over 25 percent named education as their career of choice—14 percent selected high school education, 12 percent, elementary. These institutions constitute the major and principal source of Negro higher education in this region. The probable lack of quality science scholarship and science education at these institutions, as deduced from the low level of total and Federal funding and participation in advanced study and science education, may be indicative of the low educational and economic status of American Negroes, especially those residing in the South. It is true that racial constraints are rapidly disappearing from the admission practices of large numbers of institutions of higher education in all regions of the United States. It is also true that large numbers of able and qualified Negro students now have equal opportunity in higher education. However, there still remains a significant number of Negro students, predominantly in the South, who because of being unqualified by the nature of their primary and secondary school education and because of their low socioeconomic level have but the one choice—higher education at institutions enrolling Negroes predominantly. These institutions probably at best are minor participants in Federal science programs because of ignorance of Federal programs and the marginal and low scholarship of their faculty and student body in the sciences.

Earl McGrath lays great emphasis on the need and the haste with which the Nation must develop programs to strengthen the colleges and universities enrolling Negro students predominantly. On practical grounds, he discourages any thought of euthanasia for the weaker institutions; his conclusions are borne out by the evidence:

> . . . the facts . . . relating to previous education and the financial ability of Negro students indicate that at present and to a lesser degree, for some years to come, the majority of students in the weaker colleges could not gain admission to the stronger nor afford to attend them even if admitted. *Hence, the closing of the weaker institutions would deprive thousands of Negro youth of any opportunity for higher education.*

XI. UNIVERSITIES ENGAGED IN MEDICAL EDUCATION

A Manpower Profile

There are 80 (Class A) universities engaged in medical education (MEEU) (Table C–13). There are an additional 89 Class A institutions comparable in all respects except for the fact that they do not offer medical education. These 89 institutions are used for comparison purposes—the control group. Five medical colleges are not included in the population of medical education-engaged institutions.[37]

The MEEU group received 68.9 percent of the Federal funds for academic science and accounted for 42.7 percent of the funds earmarked for the educational and general expenditures of the study group; in contradistinction, the 89 controls received 26.2 percent of the Federal funds and 23.2 percent of the academic budget (EGI). (Class A as a group received 95.1 percent of the Federal funds and 65.9 percent of the academic budget.) The MEEU group received about three times the Federal funds received by the control group. Federal funds for academic science for the MEEU group averaged $9.5 million per institution; for the controls, it averaged $3.2 million.

The medical education-engaged universities received 29 percent of their total income (R*fe* = 0.290) from Federal funds; the R*fe* for the controls is 0.222. It is the MEEU group that participates to a larger degree in graduate education and education in the sciences. The graduate education index (R*e*) for the MEEU group is 0.169; for the control group, it is 0.133. The science education index (R*s*) for the MEEU group is 0.129; for the control group, it is 0.110.

The MEEU group enrolled two-thirds as many more students per institution as did the controls—12,800 for MEEU and 7,600 for the controls. It enrolled twice as many graduate students as did the controls—2,170 vs. 1,000—and, by definition, all the doctors of medicine. It contributed twice as much to manpower training in the sciences as did the control group—1,660 S&T DP units vs. 830. It trained two-thirds as many more doctors of science and engineering—4,960 vs. 3,000, and, of course, all the doctors of medicine and 95 percent of all the dentists.

Funding Characteristics

The medical education-engaged university group received the bulk of its Federal support (Tables 9, C–3) from the U.S. Public Health Service—55.3 percent; 16.2 percent of its Federal support came from NSF and 15.8 percent from DOD. These three agencies accounted for 87 percent of the total Federal funds for academic science obligated to medical education-engaged universities. By contrast, the control group received 23.9 percent of its Federal science support from the U.S. Public Health Service, 25.4 percent from the National Science Foundation, and 25.3 percent from the Department of Defense. The control group received 75 percent of its Federal support from the three principal support agencies of academic science.

The U.S. Public Health Service committed 83.9 percent of its 1963 obligations for academic science to these same 80 (MEEU) institutions—a total of $419 million, equivalent to 38 percent of the Federal obligations to academic science for fiscal year 1963. The next two agencies, in terms of their obligational authority, also concentrated their academic science support efforts within these 80 institutions, but not to the same degree. The Department of Defense obligated 60.1 percent ($120 million) of its academic science funds to this group, and the National Science Foundation, 54.1 percent ($123 million).

Interpretations and Implications

It is predominantly the large contributions of the U.S. Public Health Service to the 80 medical education-engaged institutions, both in absolute terms and in terms of the restricted nature of USPHS appropriations, that appear to be major factors in the concentration of Federal funds for science in a limited number of institutions of higher learning and in circumscribed regions of the Nation. These regions are apt to be those where medical education is also concentrated. A further exploration of the component of Federal funds for academic science obligated directly to medical schools as such is obligatory, to further delineate the phenomenon of concentration of Federal funds and the support of health sciences by the Federal Government. The statistics now available, unfortunately, lack the necessary detail to make such a study possible.

Medical education-engaged universities operated with larger average academic budgets (EGI), $23.2 million in the academic year 1962–1963, than did the control group whose average aca-

Table 9.—Manpower and Funding Characteristics of Medical Education Associated Universities by Control

[dollars in thousands]

	No.	FFAS[2]	EGI[3]	USPHS[4] FAS	USPHSFAS FFAS	Enrollment		Science and Technology						R_e[6]	R_s[7]	R_{fe}[8]	R_{fd}[9]
						Total	Graduate	S&T DP[5]	BA	MA	PhD	MD	DDS				
Total....	1,063	$1,099,481	$4,346,393	$499,527	0.454	3,425,456	369,964	277,149	132,436	26,761	7,963	6,873	3,181	*0.108*	*0.081*	*0.202*	3,967
Average.....		1,034	4,089	470		3,222	348	261	125	25	7	6	3				
Percent[1].....		*100.0*	*100.0*	*100.0*		*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*				
Class A........	169	1,045,622	,2,864,882	488,097	0.467	1,701,687	263,699	206,533	71,528	22,902	7,963	6,873	3,181	*0.155*	*0.121*	*0.267*	5,063
Average.....		6,187	16,952	2,888		10,069	1,560	1,222	423	136	47	41	19				
Percent[1].....	*15.9*	*95.1*	*65.9*	*97.7*		*49.6*	*71.2*	*74.5*	*54.0*	*85.5*	*100.0*	*100.0*	*100.0*				
Medical Education Engaged Universities..	80	757,930	1,858,023	419,318	0.553	1,027,517	173,922	132,486	37,793	12,868	4,959	6,873	3,024	*0.169*	*0.129*	*0.290*	5,721
Average.....		9,474	23,225	5,241		12,844	2,174	1,656	472	161	62	86	38				
Percent[1].....	*7.5*	*68.9*	*42.7*	*83.9*		*30.0*	*47.0*	*47.8*	*28.5*	*48.1*	*62.3*	*100.0*	*95.0*				
Denominational	11	39,578	87,055	34,392	0.869	66,777	8,872	9,527	2,136	407	93	885	603	*0.133*	*0.143*	*0.313*	4,154
Average.....		3,598	7,914	3,127		6,071	807	866	194	37	8	80	55				
Percent[1].....	*1.0*	*3.6*	*2.0*	*6.9*		*1.9*	*2.4*	*3.4*	*1.6*	*1.5*	*1.2*	*12.9*	*19.0*				
Private........	26	356,221	664,089	195,709	0.549	308,243	74,768	45,339	10,928	4,961	1,997	2,310	888	*0.243*	*0.147*	*0.349*	7,857
Average.....		13,701	25,542	7,527		11,856	2,876	1,744	420	191	77	89	34				
Percent[1].....	*2.5*	*32.4*	*15.3*	*39.2*		*9.0*	*20.2*	*16.4*	*8.3*	*18.6*	*25.0*	*33.6*	*27.9*				
Public.........	43	362,131	1,106,879	189,217	0.523	652,497	90,282	77,620	24,729	7,500	2,869	3,678	1,533	*0.138*	*0.119*	*0.247*	4,665
Average.....		8,422	25,741	4,400		15,174	2,100	1,805	575	174	67	86	36				
Percent[1].....	*4.0*	*32.9*	*25.4*	*37.9*		*19.1*	*24.4*	*28.0*	*18.6*	*28.0*	*36.1*	*53.5*	*48.2*				

[1] Percent detail may not add to 100 because of rounding.

[2] FFAS = Federal Funds for Academic Science.

[3] EGI = Educational and General Income.

[4] USPHS FAS = Federal funds for academic science from the USPHS.

[5] S&T DP = Science and Technology Degree Productivity.

[6] R_e = Graduate Enrollment/Total Enrollment.

[7] R_s = S&T DP/Total Enrollment.

[8] R_{fe} = FFAS/EGI + FFAS.

[9] R_{fd} = FFAS/S&T DP.

demic budgets were $11.3 million; they also accounted for twice as many S&T DP units as did the controls. In the same year medical education-engaged institutions received an average of $9.5 million in Federal income from academic science; their controls averaged $3.2 million. If these data have validity, i.e., if the two populations are comparable, one may then conclude that, on the average, a *medical school* requires an academic budget equal in size to that budgeted for the rest of the parent university, and that medical education-engaged universities expend three times the Federal funds for science than do the controls. These data also show that in fiscal year 1963 the average medical school received about $6 million in Federal funds for academic science.

The analysis of Federal funds by class and control (Tables 5 and C–3) focused attention on private Class A institutions as the institutions most favored by Federal science programs. The data in Table 9 indicate that it is the medical education component of these universities that is favored by Federal funds and that it is the private sector of this medical education-engaged group that is especially favored (Table C–14). Thirty-five percent of the total income of the *private* (26 in number) medical education-engaged universities came from Federal sources (R*fe* = 0.349); the R*fe* value for the comparable, denominationally controlled group of MEEU institutions is 0.313; for the public it is 0.247. The R*fe* value for all 1,063 institutions in the study is 0.202, for Class A it is 0.267, and for the medical education component of Class A it is 0.290.

The private group of medical education-engaged institutions comprise about 15 percent of the Class A, one-half of the population of private Class A institutions, and about 2.5 percent of the degree-accredited institutions. They received 32.4 percent of all Federal funds for academic science. By contrast, the medical education-engaged public institutions, which total 43 (4.0 percent of the degree-accredited institution population), received 32.9 percent. The 69 public and private MEEU institutions, about 7 percent of the degree-accredited institution population, received 65 percent of Federal funds for academic science.

The private group averaged $13.7 million in Federal funds per institution, whereas the public component averaged $8.4 million. These two groups operated at approximately the same level of academic income (EGI)—$25.5 million per institution for the private group, and $25.7 million for the public. In connection with these figures it is worth bearing in mind that the private group has a considerably smaller average total enrollment, less than three-quarters of the public group.

Of their own funds, based on the EGI, the private medical education-engaged universities budgeted $2,150 per student enrolled; the public, $1,700 per student; and the denominational, $1,300. The corresponding figures for total research and education income (EGI + FFAS) were $3,300 for private, $2,250 for public, and $1,900 for denominational. Does this higher budgeting per student for the private universities engaged in medical education indicate that the students in residence in these universities, as a whole, are provided with a higher quality of education, where quality is equated with affluence? Or does this higher budgeting simply indicate that these private institutions participate to a greater degree in research, graduate education, and science education, and the additional cost per student is merely a reflection of these phenomena?

Although the public sector of the MEEU group enrolled about 40 percent more students than did the private, the reverse is true with respect to graduate enrollment. Graduate enrollment for the private MEEU group averaged 2,876, and for the public sector, the average figure is 2,100. The S&T DP value for the public sector is 1,805; for the private sector, it is 1,744. These values are not corrected for institution size. When they are, however, graduate enrollment and S&T DP value clearly favor the private group.

The R*e* and R*s* values, indices of level of participation in graduate and science education, indicate and confirm that the privately controlled MEEU institution concentrates more of its education effort in graduate education and in education in the sciences than does its counterpart, the publicly or denominationally controlled institution. The graduate education index (R*e*) for private MEEU is 0.243; for the public it is 0.138; for the denominational, 0.133. The science education index (R*s*) for the private MEEU group is 0.147; for the public group it is 0.119; for the denominational, 0.143.

Like the R*e* and R*s*, the R*fe* value also favors the private MEEU institution. The denominational group falls somewhere in between the private and public group. Higher R*fe*'s for the private (0.349) and denominational (0.313) groups are indicative of the corresponding high rate of dependency and/or participation in Federal science programs. The R*fe* indices (Table C–14) beyond doubt, demonstrate the depth of the dependence of each of the 26 private institutions—the private medical education-engaged universities—on Federal funds and especially on U.S. Public Health Service sources of support. Three of these institutions with the high R*fe* values now depend on Federal funds in the ratio of one dollar in Federal funds for every dollar raised from other sources (R*fe* value above 0.50); 15 of them receive more than 60 percent of their Federal funds from the U.S. Public Health Service.

Does an increasing proportion of Federal funds (in terms of total institutional income) create a greater and permanent dependence on Federal funds for these private and denominational medical education-engaged universities? Does such dependence indicate a continuance on the present level of Federal support to maintain the existing level of academic research, graduate and professional education, and education in the sciences programs? Does this dependency indicate an ever-expanding commitment of the Federal establishment? Is the dependency level established by the academic science support relationships, in the best interest of science, the academic institutions, and the Nation? Is it in the national interest for the health sciences to dominate both the Federal academic science and the science programs of the universities?

If strengthening and broadening the base of academic science are to continue as the foundation of the national policy for science,[16] then the resolution of these and related questions will have to assume a fairly high order of priority. The nature and the role of the medical school, the nature of the responsibility of the Federal Government to the health sciences and to medical education, and the concentration of medical education in a limited number of universities and in circumscribed regions of the Nation must enter into any policy considerations for science and technology.

XII. STATISTICS AND PREDICTABILITY

The evidence indicates that there is fairly good correlation between the amount of Federal funds for academic science received by institutions and the various characteristics used to measure institutional participation or productivity in higher education. In some instances the relationships are direct and linear. In other situations the relationships are not quite so direct. In some instances, the relationships are not regular. The data emphasize the fact that class and control of an institution must be considered in any comparison dealing with academic income and manpower input-output. Class and control appear to be determinative with respect to size and income, and probably with the allocation of resources to graduate and science education. State universities (public) seem to be more oriented toward educating large numbers of all types and levels of students. Private universities appear more selective—selective in the sense of a greater concentration on graduate studies, professional education, and education in the sciences. Denominational institutions appear to concentrate principally at the baccalaureate level and are the least engaged in science education.

Do these relationships, so statistically evident, hold for the individual university and college? The data accumulated thus far appear to be amenable to answer such a question, however tentatively.

Medical Education and the Level of Institutional Funding

The maximum rate of change in slope, the point at which the study population of academic institutions seems to be divided into low and high income producers, low and high producers of scientific research and of scientific and technological manpower (see Figures 4, 6, 7), focuses attention on those institutions ranked somewhere below the 100th, irrespective of whether ranking is based on the academic budget, Federal funds, graduate enrollment, or manpower productivity in science and technology. This characteristic of American universities leads to the question: Is there some phenomenon peculiar to advanced education so demanding in cost that it requires a radical shift in institutional funding practices? Is there a special factor, or is the phenomenon noted simply the response to a number of simultaneous changes associated with institution growth? If there is a special factor, can it be isolated?

One answer may be found in a consideration of the medical education component of higher education. A decision to engage in medical education entails an enormous long-range economic commitment on the part of the academic institution. There are not only the requirements for vast clinical research and training facilities basic to the education of physicians, but also the need for a host of allied health specialties ranging from pharmacy to nursing. There are the graduate medical science training activities and the associated preclinical research programs, e.g., biochemistry, physiology, etc. The accomplishments in the practice of medicine within one generation have been enormous; with these accomplishments, also have come heightened costs.

This same argument perhaps could be made for high energy physics or some other high cost academic science activity. But since high energy physics facilities and staff are considerably more limited in number and since they are funded principally by the Federal Government, the issue of medical education loses none of its significance.

The statistics bear out this major shift in institutional financing practices and point to the special burden of those activities associated with medical education. In 1962–1963 there were 87 medical schools. Of these, 80 institutions associated with medical education received $760 million in Federal funds—about 70 percent of the Federal obligations for academic science. Fifty of these were rank ordered above 70 by Federal funds and 47 by the educational and general income. Of the first 20 institutions rank ordered by Federal funds (Table C–15), all but two, the Massachusetts Institute of Technology and the University of California at Berkeley, are engaged in medical education. The University of California at Berkeley was, until very recently. Of the first 50 institutions, 39 have medical schools.

The data assembled suggest that institutions engaged in medical education expend as much for the medical school complex as they expend for the remainder of the university. These same data further indicate that medical education-engaged institutions received three times as much in Federal funds as did their counterparts—those Class A institutions without medical schools.

The 80 MEEU institutions accounted for \$1.9 billion of the \$4.3 billion of the academic budget for the 1,063 degree-accredited institutions of higher education for the academic year 1962–1963—44 percent of the total (Tables 9, C–13). These same 80 institutions, however, also accounted for 47 percent of the graduate students enrolled, 48 percent of the total S&T DP units, and naturally all the doctors of medicine and 95 percent of the doctors of dentistry. They produced 62 percent of all the doctorates in science and engineering. The graduate education index—R*e* value—for these 80 institutions is 0.169 (average 0.108) and the science education index—the R*s* value—is 0.129 (average 0.081).

Since the upper part of the family of curves related to Figure 4 refers to characteristics apt to be associated with affluent institutions—concentration on graduate studies, high productivity in science and medical education, of doctorate degrees in science and engineering, and of scientific research—one can readily understand why these curves all show the sharp and similar change in slope. Each of the criteria of affluence depicted—funds, high productivity in research, graduate and science education—is seemingly characteristic of those, in the upper segment of universities associated with medical education.

The conclusions are fairly obvious: (1) a high proportion of medical education-engaged universities are among the most affluent institutions; (2) they are also highly productive in both manpower and research in science and technology; and (3) they are dependent for a large share of their total income on the Federal establishment.

There appears to be no way to tease out the facet of the medical school's activities—medical research, medical education, or graduate education—that is specifically responsible for the shifts in the education-funding phenomenon described in Figures 4, 6, 7. For the present, the most to be gained from the existing data is a set of facts that establish a critical mass effect in academic institutional budgeting. When a university embarks on a program of medical education there appears a manifestation of a change which leads the institution into a new and higher level of funding. It seems quite clear the *universities* associated with medical education fall in a special class of institutions when measured by their funding characteristics and/or productivity in science and technology. The evidence submitted reinforces the strongly held view of administrators of higher education, that the medical school can be an enormous drain on an educational institution's budget.

A Profile of the Individual University

Each of the two hundred institutions and their individual profiles were arranged (Table C–15) so that they might be inspected and compared with respect to a number of institutional characteristics. The 200 academic institutions in the sample were selected soley on the basis of the level of Federal funds and rank ordered accordingly. (See Tables B–1 through B–9 for the rank ordering details.) Since the private-denominational and public universities show marked differences in total enrollment and educational and general income, these two segments of institutions studied were selectively compared. It is not meaningful in this context to compare, for example, the California Institute of Technology with Purdue University. Another methodological constraint is that liberal arts colleges were not used in the comparisons about to follow, because of the limitations imposed by the selection criteria, because they are neither major producers of research nor contributors to advanced degree science and technology education. The comparison in this instance was limited to 100 universities.[48]

The uniformity of the data on the whole appears self consistent. Those institutions rank ordered high by Federal funds also tend to be rank ordered high by a number of other, but not necessarily by all, characteristics. Those rank ordered low by Federal funds also tend to be ranked low by the other, or a significant number of other criteria.

For the discussion that follows, rank ordering by Federal funds will be interpreted to mean productivity in research and the S&T DP rank order will be used for productivity in science education. Quality values are not in any way implied. The terms low producers and high producers will be used without qualification, but it is assumed that the reader recognizes that they are relative terms.

There are a number of institutions in this group whose rank order leads one to believe that they are high producers of research and low producers of scientific manpower. Johns Hopkins, Rochester, Washington at St. Louis, Duke, the University of California at San Diego, Western Reserve, Yeshiva, Tulane, Oregon, Brown, Baylor, and Vanderbilt Universities seem to fall in this group. Does this information mean that these institutions have unused additional capability for training? There are also a number of institutions that appear to be low producers of research and high producers of scientific manpower. Purdue, Pennsylvania State, Tennessee, Michigan State, Rutgers State, Missouri, Iowa State, Oklahoma State, North Carolina State, and Kansas State Universities seem to fall within this category. Does this information indicate that these institutions are capable of more research than they undertake?

Probing a bit further, Johns Hopkins University may be categorized a high producer of research and a low producer of scientific manpower. It ranks tenth in Federal funds for academic science—a high producer of research—65th for graduate enrollment, 62nd for S&T DP, 97th for the bachelor's degree, 102nd for the master's degree, and 31st for doctorate production—a low producer of scientific manpower. The University of Rochester seems to follow a similar pattern. At the other extreme is Purdue University which may be said to be a low producer of research and a high producer of scientific manpower. It ranked 34th according to Federal funds and between 3rd and 5th for scientific manpower productivity. It ranks remarkably high in manpower produced considering its own funding characteristics. Is the low Purdue funding characteristic (EGI) due to the lack of a medical school? Or is it because Purdue can conduct its training programs in a more efficient fashion? Pennsylvania State University shows a pattern similar to Purdue University of low productivity with respect to research as measured by Federal funds for academic science and high productivity with respect to degrees in science and engineering. Pennsylvania State, on the other hand, invests a larger share of its own funds in education. Iowa State University of Science and Technology is a dramatic example of a low producer institution with respect to research and a high producer with respect to training in the sciences. It ranks 68th with respect to Federal funds, 18th with respect to bachelor's degree production in science and engineering, 30th with respect to master's degrees, and 13th in doctorate productivity.

Cartter's peer-quality directed data for the academic year 1963–1964, rank ordering university departments of science and engineering for "graduate program effectiveness,"[49] adds considerable value to the statistical method (Table C–15) of appraising academic institutions even though they do not lend themselves easily to a comparison with the data rank ordering institutions by statistical criteria characteristic of academic science. Cartter's study did not include large segments of medical and dental schools and in far too many instances, the number of departments of science and engineering specifically evaluated within an institution were too few for a statistical analysis of the institution's standing in academic science. In spite of these constraints, the 18 universities adaptable for comparison from the

Cartter study—those with 10 departments or more of science and engineering evaluated—showed that 15 of these institutions placed within the first 17 ranked by Federal funds. This sort of evidence, as indirect, as displaced in time, and scanty as it may be, does demonstrate that both subjective and statistical types of studies aimed at evaluating institutions of higher education in terms of quality and productivity, have sufficient merit to warrant further investigation.

A Profile of the Individual Liberal Arts College

The compilation (Table C–15) may serve still another purpose—that of more carefully scrutinizing the system of Federal funding as it correlates with quality science education as conducted by the liberal arts colleges. The discussion below will be limited to a selected group of liberal arts colleges. The doctorate producers among the liberal arts group will not be considered.

Within the first 200 institutions rank ordered by Federal funds the following liberal arts colleges are to be found: they are Reed (rank ordered 164), Wesleyan (167), Ohio Wesleyan (170), Antioch (182), William and Mary (183), Smith (187), Amherst (189), Pomona (193), and Earlham (199). Bearing in mind that there are 711 institutions receiving Federal funds for academic science, among which are a great number of relatively large and high-quality enrollers-producers of scientific manpower, these institutions rank fairly high in bachelor's degree production in the sciences. For it is to be noted that liberal arts colleges rank quite low in total enrollment. In other words, their comparative contribution to science education is relatively high, considering their size and the fact that their principal educational contribution is at the first-degree level.

It is interesting to note further, that these liberal arts colleges, all without doctorate programs, compete fairly well for Federal funds. They also rank fairly high in terms of their own investment in education (EGI), further indicating that there is a continued correlation between affluence and Federal funds that holds even for the liberal arts colleges. But these analyses are much too limited and the data too sparse for a more informative examination of the relationship of Federal funds and liberal arts colleges. Certainly a more definitive study is in order.

The Value of Academic Statistics

From the use of the type of data presented in Table C–15, concerning the universe of the academic institution, one can foresee any number of interpretations. Interpretations at this stage, however, are much too speculative, irrespective of how lightly they are made or considered, for the data are much too imprecise and much pertinent data are still not available. Furthermore, the measures used still require shaping and sharpening. Therefore, any use of this type of tabulated material for making absolute judgments at this time, respecting individual institutions is both premature and fraught with risk. However, it is possible that with time, refinement of data and metrics, and their judicious use in conjunction with substantive knowledge of science and the academic institution, that the methodology and techniques employed here might have value in making judgments with respect to productivity and quality of science education and scholarship for individual academic institutions. The prognosis is promising.

XIII. NOTES AND REFERENCES

[1] A. Hunter Dupree. *Science in the Federal Government.* Harvard University Press. Cambridge, Mass., 1957.

[2] Irvin Stewart. *Organizing Scientific Research for War—The Administrative History of the Office of Scientific Research and Development.* Atlantic, Little, Brown. Boston, 1948.

[3] Vannevar Bush. *Science, The Endless Frontier.* Washington, D.C., 1945.

[4] *Federal Funds for Science I, Federal Funds for Scientific Research and Development at Nonprofit Institutions 1950–51 and 1951–52.* National Science Foundation.

[5] *First Annual Report of the National Science Foundation.* National Science Foundation, Washington, D.C., 1950–51.

[6] Nicholas DeWitt. *Soviet Professional Manpower—Its Education, Training and Supply.* National Science Foundation. Washington, D.C., 1955.

[7] *Federal Funds for Research, Development and Other Scientific Activities.* Volume VIII through Volume XIV. National Science Foundation.

The concept of "Federal funds for research, development and other scientific activities for colleges and universities proper," differs from "academic science" as used in this study in that it includes plant and construction and excludes science education and science information obligations.

[8] *The Administration of Grants by the National Institutes of Health.* Hearings before the Subcommittee of the Committee on Government Operations of the U.S. House of Representatives, 87th Congress, March 1962.

[9] *National Science Foundation Fourteenth Annual Report, 1964.* NSF–65–1.

[10] *The Federal Government and Education.* Committee on Education and Labor, U.S. House of Representatives, 88th Congress, June 1963.

[11] *Activities of the Select Committee on Government Research.* The U.S. House of Representatives, 88th Congress, 1964–65.

[12] *National Academy of Sciences Panel on Basic Research and National Goals.* Hearings before the Committee on Science and Astronautics, U.S. House of Representatives, 89th Congress, April 1965.

[13] *Basic Research and National Goals.* A report to the Committee on Science and Astronautics of the U.S. House of Representatives. U.S. National Academy of Sciences, March 1965.

[14] *Scientific-Technical Advice for Congress Needs and Sources.* Staff Study for the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, 88th Congress, October 1964.

[15] *Government and Science. Geographical Distribution of Federal Research and Development Funds.* Report of the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, 88th Congress, October 1964.

[16] *The National Science Foundation, Its Present and Future.* Report of Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, 89th Congress, December 1965.

[17] *Conflicts Between the Federal Research Programs and the Nation's Goals for Higher Education.* 18th Report by the Committee on Government Operations of the U.S. House of Representatives, 89th Congress, October 1965.

[18] Higher Education Act of 1965, Public Law 89–329. 89th Congress, H.R. 9567, 8 November 1965.

[19] National Foundation on the Arts and Humanities Act of 1965, Public Law 89–209, 89th Congress, 29 September 1965.

[20] *Federal Support of Basic Research in Institutions of Higher Learning.* National Academy of Sciences (Committee on Science and Public Policy), Washington, D.C., 1964.

[21] The term university is used here to include every institution of higher education associated with graduate or professional education, including those called institutes of science and/or technology (e.g., the Massachusetts Institute of Technology) and independent medical colleges (e.g., Hahnemann Medical College).

[22] *Education Directory,* 1963–1964. Part 3, Higher Education. The Office of Education, Washington, D.C., OE–50000–64.

[23] Allan M. Cartter, *American Universities and Colleges, 9th Edition.* American Council on Education, Washington, D.C., 1964.

[24] Survey of Earned Degrees Conferred, 1962–1963. Special tabulation prepared for the National Science Foundation by the Office of Education.

[25] "Medical Education in the United States, 1962–1963," *Journal of the American Medical Association, 186,* 649, 1963.

[26] Dental Students Register, 1963/1964, American Dental Association.

[27] During the course of the study a number of situations arose that caused changes in concepts and definitions. As with most studies of this type, the time came in the development of the data where the study was committed. For example, at one point, the concept "academic science" was broadened to include support programs for uplifting high school science teachers and course content improvement. In another case the Class A institution category was broadened to include the professional medical and dental degree institutions. Unfortunately, during the incorporation of medical-dental education degrees into the study of degree productivity, five medical schools inadvertently were left out. These institutions are principally professional schools; hence no bachelor's degree students are enrolled. Since by definition the degree-accredited institution is an institution that grants at least the bachelor's degree, this qualification somehow took precedence, with the result that the production of at least one bachelor's degree became a qualifying rule and independent medical colleges were dropped. The five institutions left out of the study are: the California College of Medicine, Los Angeles; Chicago Medical School, Chicago; New York Medical College, New York; Woman's Medical College of Pennsylvania, Philadelphia; and Meharry Medical College, Nashville.

Institutions such as the Woods Hole Oceanographic Institute, even though classified as educational, are excluded, for they themselves do not confer degrees. Those, such as the Brookhaven National Laboratory, are excluded because they are, in addition, contract research centers.

[28] William V. Consolazio. "Sustaining Academic Science, 1965–1975," *The Educational Record, 216,* Spring 1964.

[29] *Grants for Scientific Research.* National Science Foundation, June 1963, NSF 63-27.

[30] In a few cases, such as in the Biological Science Curriculum Study (BSCS) supported by the National Science Foundation at the University of Colorado ($1.8 million), the contribution of NSF for academic science for that institution is exaggerated. The BSCS program is located at Colorado primarily for convenience. Fortunately, this incident is highly atypical.

[31] The educational and general income (EGI) item is not a measure of an institution's educational-operating budget. In the first instance, the statistic refers to income, not expenditure. Furthermore, there appears to be a lack of definitional uniformity for educational and general income. Capital expenditure—"gifts and appropriations for capital expenditure"—seemingly a part of the items under this rubric, is not always included. On the other hand, "auxiliary" income seemingly excluded, is not in some instances. However, the EGI is the statistic most available which relates to an institution's investment in education, and to a degree it does give a measure of institution expenditure, size, affluence, and perhaps even quality.

Federal funds for academic science are used as an absolute measure of the Federal impact and generally speaking as a measure of an institution's participation in academic science (research). The educational and general income excludes an institution's grant-contract research funds. To derive an expression of an institution's total fiscal contribution to research and education, therefore, requires the incorporation of grant-contract research funds, or some reasonable substitute, into the educational and general income data. Since the statistics available for total grant-contract research were much too unreliable and not always available, Federal funds for academic science data were substituted.

The assumption that Federal funds can be used as a measure of an institution's participation in academic science is permissible only if limited to the total spectrum of activities in science and technology. It is not intended to equate costs per unit of research or education productivity in one substantive area with those in another, for it is well recognized that the physical sciences require more expensive and sophisticated facilities than do the life sciences, and that the biological sciences bear the same relationship to the social sciences.

[32] Howard University and Gallaudet College in the District of Columbia both are partially supported by the Federal Government, and thus receive direct appropriations.

[33] There is a time lag between the receipt of Federal funds for academic science (obligations) and their expenditure by universities and colleges for research, science education, etc. In most cases the lag is of the order of one-half year. Funding by the U.S. Public Health Service falls within types characteristic of this short-time lag system. But there is the situation that is characteristic of National Science Foundation and Office of Naval Research multiple year funding practices, wherein the average life of the grant or contract is of the order of two years. Here the time lag may be as long as one and one-half years. Fortunately, one is dealing here with a pipeline system of funding. At any time "t," expenditure and obligations may be considered in relative equilibrium except in instances where the obligation jumps by major increments. Since there has been no large incremental increase in Federal funds for academic science within the last several years, for all intents and purposes, obligations and expenditures, accordingly, can be considered as synonomous. (Obligations for total research and development for colleges and universities proper increased from $800 million in fiscal year 1962 to $1,060 million in fiscal year 1964,[7] roughly 10 percent per year.)

[34] There is also some doubt about the full coverage of funding by the National Aeronautics and Space Administration. As in the case of the Department of Defense, the discrepancy in terms of total Federal obligations for academic science is slight, so that it will not affect the Federal influence appreciably.

[35] It would have been preferable to have had manpower data over a longer time span than the one year used. Unfortunately, fiscal year 1963 and academic year 1962–1963 provided the most recent element of time where the pertinent manpower and fiscal data concerned existed in sufficient depth. Longer time-span manpower data would tend to iron out the peaks and troughs of the statistics; they also would give more stability to the institution classification system. By employing long-term statistics, marginal producers of advanced degree scientists and engineers tend to become better recognized, thus making possible better comparability procedures in such studies.

A good compromise would have been a classification of institutions based on a three-year enrollment-degree spread, and productivity measurements based on the most recent academic year.

The enrollment data—total, graduate, undergraduate—although readily available and timely, are not as reliable as one would expect. Enrollment data do not always take into account summer and evening students, although degree data do. Not all graduate students are formally enrolled. Frequently, as happens in the case of Class B institutions, published graduate enrollment statistics for individual institutions do not correlate with those for graduate degrees granted. In a number of institutions graduate student enrollment data can be procured only by difference calculations—the difference between total enrollment and undergraduate enrollment. Difference statistics do not always distinguish between advance and graduate degree statistics. However, graduate degree and total enrollment data, even with their limitations, do measure an institution's educational level of attainment and the capacity for graduate education.

The validity of total enrollment data is especially critical in this study. It affects those indices which relate to the measurement of how an institution allocates its resources to education in science and technology (see derivation of R_s). Although full-time enrollment data might have been more meaningful, incomplete coverage of such statistics precluded their use. The same is true for full-time graduate degree enrollment data in the derivation of R_e.

Total enrollment data tend to exaggerate the size and the educational contributions of urban institutions, especially those that enroll large numbers of part-time and evening students. They also tend to underestimate the contributions of those institutions whose graduate students are in thesis preparation but not registered. A more precise and meaningful measure of an institution's total contribution to higher education is a unit measure that reduces all degrees awarded in terms of a common standard unit.

There is a problem in making comparisons between enrollment data of one year and degree data for earlier enrollment years. These are deficiencies in the study because they fail to account fully for the phasing of the educational process. As with obligations and expenditure data, there is a time lag between enrollment and degree—four years for the bachelor's and three or more beyond the baccalaureate years for the doctoral. However, since most established institutions are in a steady state of development, whatever growth there is, is comparable, and any discrepancy between enrollment and degrees conferred is not serious. The differences can be serious in absolute terms, but in the relative terms with which we are dealing, such differences are probably not of great significance. Though some parts of the education system may be in a state of flux, the total system is moderately stable. Class A institutions may be said to have reached a steady state; they seem to be changing simply by expansion.

Class B institutions are undergoing a greater change, but even they are primarily expanding at the fringes, principally increasing their productivity of bachelor's and master's degree students. And Class C institutions show little change within. They too are changing by an increase in enrollment. A few Class C institutions are leapfrogging into Class A. However, the number of institutions crossing over into other classes is small; in these few instances the informed student of education is usually aware of the exceptions, and so can make the necessary adjustment.

Degree data, in general, in contradistinction to enrollment data, can be considered to be fairly "hard." They have behind them the solidity of many years of use and the precision of being monitored or qualified by national organizations representative of the discipline associated with the degree. Degree data specific for the various degree levels granted in science and technology also can be considered hard. Though the quality of the degree is not always comparable interinstitutionally, there are both minimum standards (in most cases imposed by national associations) and those traditional standards and practices that qualify and distinguish the doctorate from the master's and the master's from the bachelor's degree.

Numbers of degrees and the degree level under similar circumstances have come to have wide acceptance in making rough qualitative judgments relative to educational institutions. From a statistical viewpoint, it is one of the very few qualitative devices of manpower productivity available to the student of the educational process. Counting the number of graduates is, of course, not a criterion of quality, but it does have value as one measure of an institution's quantitative productivity—its manpower output. It is at the productivity level that there has existed a fusion or confusion of quality with quantity, for degree statistics associated with the level of study in science and technology have been and continue to be used as relative measures of quality and productivity. In this study the simple addition of various degrees granted has been used as a measure of productivity. But such devices are limited to institutions of a like nature, hence, these simple summation measures have been depended upon, only when used in conjunction with other confirming measuring techniques.

[36] *Opening (Fall) Enrollment in Higher Education, 1962, Institutional Data.* U.S. Department of Health, Education, and Welfare, Office of Education. Washington, D.C., OE-50003-62.

[37] *Enrollment for Advanced Degrees.* The U.S. Department of Health, Education, and Welfare, Office of Education, Washington, D.C., OE-54019-62.

[38] It is accepted convention to rank the doctorate higher on the scale of education than the master's degree or the baccalaureate. Weighting degrees in terms of a base unit, the bachelor's degree, is not new. Students of educational economics and productivity, for years have used a simple and arbitrary system of weighting, based on the bachelor unit weight of one, where the master's degree is two, and the doctorate three or four. These numerical values appear to be derived from the average number of years spent in postbaccalaureate training with the baccalaureate as the base. This numerical system has served moderately well, but it is arbitrary and like most such systems its comparative and extended use is open to question. It also became quite obvious that any weighted base unit, if it were to have meaning, had to be tied closely to the value of a degree. Giving such value to a unit is especially difficult. The value most amenable to reason and pragmatism turned out to be the cost of educating a student—the cost of producing a bachelor, master, and doctoral graduate, or a veterinarian, doctor of medicine, or doctor of dentistry. Cost information, although scarce and questionable, does exist. Both the Office of

Education and the Office of Economic and Manpower Studies of the National Science Foundation[28] made basic education cost estimates in the year 1962. These estimates were modified further and adapted to the present study.

In its simplest terms the system finally adopted was based on the full cost of training (education, not subsistence) the baccalaureate in science and engineering. The full cost estimate of $5,200 for the baccalaureate in science and engineering accordingly was assigned a value of one.

This base unit (see derivation below), henceforth, will be referred to as the science and technology degree productivity unit (S&T DP).

Baccalaureate Degree in Science and Technology (BS)

Instruction at $1200/year × 4	$ 4,800
Research at $100/year × 4	400
	$ 5,200

BS = 1

Doctor of Veterinarian Medicine (DVM)

Instruction and research undergraduate (2 yrs)	$ 2,600
Instruction for DVM $2,000/yr (4 yrs)	8,000
Research at $600/yr (1 yr)	600
	$11,200

DVM—11,200/5,200 = 2.2

Master's Degree in Science and Technology (MS)

Instruction and research undergraduate (4 yrs)	$ 5,200
Instruction for MS $3600/yr (2 yrs)	7,200
Research at $600/yr (1 yr)	600
	$13,000

MS—13,000/5,200 = 2.5

Doctor of Medicine and of Denistry (MD & DDS)

Instruction and research undergraduate (4 yrs)	$ 5,200
Instruction for MD and DDS at $3600/yr (4 yrs)	14,400
Research at $1000/yr (1 yr)	1,000
	$20,600

MD or DDS—20,600/5,200 = 4.0

Doctorate in Science and Technology (Phd & DSc)

Instruction and research undergraduate (4 yrs)	$ 5,200
Instruction for PhD and DSc at $3600/yr (4 yrs)	14,400
Research at $1000/yr (4 yrs)	4,000
	$23,600

PhD or DSc—23,600/5,200 = 4.5

The degree costs were arrived at by treating each degree as though it could be separated into two parts, instructional and research—where research ranged from a library thesis, through special laboratory training, to experimental thesis research. Accordingly, the $5,200 assigned to the cost of the bachelor's degree became $4,800 for instruction and $400 for research. In each case the number of years and the cost per year for the conduct of research are merely a basis for arriving at an estimate of the cost. The total cost has meaning in that it serves as a common base for costs associated with all degrees. Though the cost estimate for the basic unit (the production of one bachelor's degree in science and technology in 1962) is obviously low when considered in terms of present costs, the values derived for each of the degree levels are relative and comparable. They are all based on a common time period and constant.

The postbaccalaureate training costs of the master's degree, the doctoral degree, and the doctor of medicine and dentistry degrees were set at $3600 per year, about twice the annual cost for training the doctor of veterinary medicine. It is assumed that the doctor of veterinary medicine requires less elaborate facilities in his training than is required by the other four degree candidates. The principal differences in the five advanced degree entities lie in the increasing number of years and the additional cost per year assigned to the more advanced degree categories like the doctorate of science and the doctor of medicine and dentistry. The only difference in cost between the doctor of science and the doctor of medicine and dentistry is one of the number of years engaged in the conduct of research. These are admittedly assumptions which may need refinement as actual data on degree costs are developed.

Since the metric S&T DP is to be used in characterizing an institution or a class of institutions in terms of productivity in science education, a number of weaknesses in application must be made manifest. There is no recognition given to who actually pays the student costs—that is, private, public, institutional and personal sources of income may contribute at one time or another to such costs. Who pays the bill is not at issue, for cost is merely used to establish value and not to give credit. The S&T DP metric also makes no correction for the fact that the advanced degree type institution tends to accumulate productivity credit for the baccalaureate contributions of a liberal arts college. It also makes no correction for the multiplier effect resulting from the inclusion of the same person in the unit system at various times in his career. A student at one time may be included in the calculation as a bachelor's degree recipient, at another as a master's degree and at still another time as a doctorate. These are serious faults if the numerical rating expressed by the S&T DP measure is used as a hard number. If, however, it is used in a fashion similar to the concept *Gross National Product,* as a relative measure of the absolute state of the economy with a number of qualifications (and only in conjunction with other complementary measures), then the issue of degree of hardness becomes moot. The S&T DP is used in the indicator sense, and like the GNP attempts to reduce a number of different weighted, related items into a common unit system of expression.

The defects enumerated for the S&T DP concept are not unique. These faults occur equally in other measuring systems of productivity. The multiplier effect and/or crediting graduate schools for the baccalaureate contributions of liberal arts colleges is equally a problem of conventional systems of giving value or worth to the degree whether the system is one based on assigning arbitrary values or the common usage system of giving greater value or worth to the doctorate when compared to the master's or bachelor's degree. The advanced degree is usually, solely credited to the graduate (granting) institution.

[39] One of the principal merits of the concept R_e is that it provides a basis for measuring, and hence ascertaining an institution's relative contribution to graduate level education. It is not an *absolute* measure of an institution's participation in graduate education. Graduate enrollment data or graduate degrees are used in this capacity.

[40] To construct and give meaning to the index (R_s), that relates an institution's total productivity in science education to total educational capability is considerably more difficult than the previous index R_e, for ideally the expression should compare total contribution to science education to total educational out-

put. The various degrees in graduate and advanced education in the sciences are not univalent, and science and technology enrollment data would not satisfy the expression. In addition, this type of enrollment data is not now available. Since no measure of an institution's total educational output exists, input (total enrollment) will have to suffice.

R_s has some of the same limitations inherent in R_e and the additional constraint that S&T DP is a weighted measure and not an absolute count of an institution's contribution to scientific and technological education. In addition the numerator is expressed in terms of degrees and the denominator in students enrolled. The substitution of enrollment data for the degree units in science and technology would not have satisfied the basic requirements of this index for the simple reason that enrollment data for science and technology fail to be representative of the differences and values of the various levels of educational attainment (degrees). R_s, in spite of its constraints, does satisfy the basic requirements for a measure of an institution's relative output of scientific and technological manpower—the allocation of educational resources to science and technology.

41 The academic budget, consisting of the educational and general income (EGI), is a measure of an institution's affluence and to some degree it can be considered a measure of its size. Generally, affluence and size both bear a relationship to an institution's total contribution to education. Total enrollment is a measure of an institution's contribution to higher education only as it relates to the total number of individuals receiving educational benefits. It fails to distinguish among undergraduate, graduate, and advanced degree education, neither does it recognize research. The institution's budget, however, also fails to distinguish among the manpower elements of education, but it at least is an integrated measure of all the elements of an institution's commitment or investment in education expressed in terms of dollars. The budget, then, is a better measure of an institution's absolute contribution to higher education. When combined with enrollment data, it has complementary value and can, therefore, serve as a tool for measuring total contribution to higher education.

When used together these data not only reinforce each other, they add another dimension to systems of measurement dealing with institutional size and educational contribution. Accordingly, the EGI (the academic budget) is used here as a measure of an institution's own contribution to higher education, and in part as a measure of its affluence. Combining the educational and general income with Federal funds for academic science (EGI + FFAS) results in a term which represents the institution's total contribution to higher education (institutional income). This institutional income serves as one leg of the ratio.

Federal funds statistics are used here as the absolute measure of the level or size of Federal academic science programs. (Not infrequently they are used as an absolute measure of an institution's science quality and in lieu of grant-contract research funds.) Federal funds data, however, do not readily serve as a measure of the impact or the influence of the Federal Government on the institution, unless they are used in conjunction with a normalizer or used in comparative terms. In other words, such data must be normalized to account for the institution's absolute size and affluence or to account for its output or total contribution to science education. As stated earlier, total insitutional income can serve in this capacity. The use of the other absolute measure of size or contribution to total education—total enrollment—is less than satisfactory because it is not a measure of contribution and it makes no distinction for the various levels of higher education or the degree to which it contributes to education quantitatively or qualitatively. In this case institutional income—EGI + FFAS—at least is a measure of an institution's own commitment or investment in higher education (including research), and it does have a reference to total productivity in science and education. Therefore, in constructing the ratio that is to serve as an index of the Federal impact on the totality of an institution's productivity in higher education—research and education—total institutional income is used as the denominator and Federal funds for academic science as the numerator.

The measure R_{fe} has some of the same constraints inherent in R_e and R_s. Federal funds are obligations and contain all the limitations of obligations, and the academic component of the institutional income (EGI) is not an ideal nor an absolute measure of the institution's operating budget. The academic budget (EGI), nevertheless, appears to be the best type of data available, and even with all its impreciseness, it does give one an absolute and integrated measure of an institution's contribution (investment) to education. Federal funds do satisfy the required research component of total institutional income. R_{fe} does contain common terms in both the numerator and denominator (dollars), and, as an index, is sufficiently hard so as to measure adequately the Federal impact phenomenon.

[42] R_{fd} is a straightforward expression except for the denominator S&T DP. Here as with R_s, the S&T DP value is limiting because of the constraints inherent in the weighting system. The S&T DP unit does, however, fulfill the requirements of comparability, for each science and technology degree value has a common derivation, the bachelor's degree, and as such lends strength to the use of R_{fd} as an index of impact of Federal funds.

[43] Although the R_e is not an absolute measure and does not distinguish between large and small institutions, the assumption can be made with some degree of certainty that small institutions cannot have high R values and that large institutions cannot have very small R's. It appears that an institution must reach a critical mass in total size (total enrollment) to sustain a graduate program of any appreciable magnitude. There are many exceptions, of course, e.g., Rockefeller University and Claremont Graduate Center and University. Institutions with highly developed graduate programs also tend to be the larger institutions.

[44] The Federal funds for academic science total reported here is higher than the figures reported in the NSF publication *Federal Funds for Research, Development and Other Scientific Activities*[7] by 17 percent (Table C-4), well within the agreement expected. The FFAS data cover more than just the research component of academic science. The reference study is restricted to research; Federal funds for academic science include research, science education, science information, and institutional base grant funds. The data reported for both studies exclude plant and contract research centers. However, FFAS data do include plant associated with the development of specialized facilities—computer and nuclear research centers. FFAS data are higher in each of the agency obligations compared, as they should be, except for the estimate of the U.S. Department of Defense and the National Aeronautics and Space Administration. The discrepancies (DOD and NASA) are not to be minimized, but they do not affect the analysis dealing with Federal impact on academic science. They do, however, affect estimates dealing with DOD and NASA contributions to liberal arts colleges and the less affluent institutions.

[45] Gerard Piel, "Federal Funds and Science Education," *Bulletin of Atomic Scientists*, p. 10, May 1966.

[46] Meharry College is not included in the study population of degree-accredited institutions.[37] Accordingly, the statement referring to the production of graduates in medicine applies specifically to the study population.

Howard University, through the U.S. Department of Health, Education, and Welfare, receives a direct appropriation from the Congress.

[47] Earl J. McGrath, *The Predominantly Negro Colleges and Universities in Transition*. Teachers College, Columbia University, 1965.

[48] Within these first 100 institutions, there are three institutions that are nonproducers of the doctoral degree in science and technology—the University of Puerto Rico, Dartmouth College and Seton Hall College. Dartmouth recently instituted a doctorate program in science, even though no degree data were reported for the year 1962–1963. The other two institutions appearing in the sample of 100, seem to be there because of their dominant medical schools. Rockefeller University is the only institution in the group without a bachelor's or master's degree program; the University of California at San Diego is the only institution without a baccalaureate program.

[49] Allan M. Cartter. *An Assessment of Quality in Graduate Education*. American Council on Education, 1966.

[50] James A. Perkins. *The University in Transition*. Princeton University Press, Princeton, New Jersey, 1966.

[51] Nowhere in this paper is there a discussion of geographic and regional distribution of Federal funds, although the evidence from tabulations made, indicates that Federal funds correlate well with population, with regional and State appropriations for total and higher education, with the internal revenue collection, and with personal income. The discussion here has been limited to Federal funds and the academic institution, for it is the academic institution (not land mass) that is determinative with respect to manpower productivity and scholarship (research) and that bears the burden and carries the responsibility for science education and scientific research. In fact, it is the people within these institutions, faculty and students, that are affected by and in turn affect Federal funds, the institution acting only in the capacity of the vessel for the conduct of scholarship and the storage and dissemination of knowledge.

APPENDICES

Table A–1

SELECTED FUNDING AND MANPOWER CHARACTERISTICS IN SCIENCE AND TECHNOLOGY OF DEGREE-ACCREDITED INSTITUTIONS
RECEIVING FEDERAL FUNDS FOR ACADEMIC SCIENCE IN FISCAL YEAR 1963 AND ACADEMIC YEAR 1962-63
ARRANGED ALPHABETICALLY BY STATE AND CLASS

(Agency Obligations Are For Those Three Agencies Responsible for Principal Federal Support)

	Control	Enrollment		R_e	S&T DP	Degrees						R_s	Dollars in Thousands					R_{fe}	R_{fd}
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
ALABAMA																			
Class A																			
Alabama, University of	Public	14,477	1,444	0.100	1,237	461	71	21	-	50	76	0.085	14,544	6,175	351	3,771	136	0.298	4,992
Auburn University	Public	8,982	804	0.090	863	508	88	6	49	-	-	0.096	17,489	1,106	205	417	186	0.059	1,282
Class B																			
Alabama College	Public	1,302	2	0.002	77	47	12	-	-	-	-	0.059	1,336	112	-	-	112	0.077	1,455
Birmingham-Southern College	Denom.	1,026	10	0.010	81	78	1	-	-	-	-	0.079	1,008	157	-	-	157	0.135	1,938
Tuskegee Institute	Private	2,450	114	0.047	91	46	10	-	9	-	-	0.037	2,794	346	-	135	191	0.110	3,802
Class C																			
Livingston State College	Public	750	7	0.009	25	25	-	-	-	-	-	0.033	545	7	-	-	7	0.013	280
Talladega College	Denom.	425	-	0	26	26	-	-	-	-	-	0.061	429	16	-	-	16	0.036	615
ALASKA																			
Class A																			
Alaska, University of	Public	3,549	80	0.023	87	38	14	3	-	-	-	0.025	4,080	2,293	526	342	761	0.360	26,356
ARIZONA																			
Class A																			
Arizona State University	Public	15,453	3,319	0.215	668	332	127	4	-	-	-	0.043	11,311	1,644	209	330	813	0.127	2,461
Arizona, The University of	Public	16,275	1,913	0.118	1,096	478	184	35	-	-	-	0.067	21,525	4,943	603	654	1,641	0.187	4,510
Class B																			
Arizona State College	Public	3,301	201	0.061	71	58	5	-	-	-	-	0.022	2,898	106	-	-	106	0.035	1,493
ARKANSAS																			
Class A																			
Arkansas, University of	Public	7,899	783	0.099	1,114	390	143	13	-	-	77	0.141	13,472	3,736	-	1,820	531	0.217	3,354
Class B																			
Arkansas State College	Public	4,096	111	0.027	127	107	8	-	-	-	-	0.031	1,863	15	-	-	15	0.008	118
Arkansas State Teachers College	Public	2,491	121	0.049	129	104	10	-	-	-	-	0.052	1,242	6	-	-	6	0.005	47

Class C																		
Arkansas Polytechnic College	Public	1,602	-	0	73	73	-	-	-	-	-	0.046	1,026	27	23	-	4	0.026	370
Little Rock University	Private	1,780	-	0	23	23	-	-	-	-	-	0.013	695	14	-	-	14	0.020	609
Southern State College	Public	1,441	-	0	26	26	-	-	-	-	-	0.018	943	5	-	-	5	0.005	192
CALIFORNIA																		
Class A																		
California Institute of Technology	Private	1,339	644	0.481	856	133	127	90	-	-	-	0.639	8,721	9,455	1,081	2,460	2,787	0.520	11,046
California, University of - Berkeley	Public	25,092	6,822	0.272	4,848	1,757	666	317	-	-	-	0.193	55,095	29,361	3,232	14,940	9,138	0.348	6,056
California, University of - Davis	Public	4,116	716	0.174	926	270	111	62	45	-	-	0.225	18,047	8,475	149	3,673	755	0.320	9,152
California, University of - Los Angeles	Public	20,189	5,505	0.273	3,035	1,131	394	157	-	-	53	0.150	45,100	19,196	2,762	11,657	2,757	0.299	6,325
California, University of - Riverside	Public	2,173	352	0.162	225	146	28	2	-	-	-	0.104	8,906	1,503	155	526	651	0.144	6,680
California, University of - San Diego	Public	205	205	0	43	-	8	5	-	-	-	0.210	5,240	11,084	5,306	693	2,789	0.679	257,767
California, University of - San Francisco Medical Center	Public	2,833	227	0.080	858	47	18	20	-	73	96	0.303	16,159	4,739	191	4,365	45	0.227	5,523
Claremont Graduate School and University Center	Private	722	496	0.687	84	-	12	12	-	-	-	0.116	1,754	308	-	83	90	0.149	3,667
Loma Linda University	Denom.	1,066	90	0.084	608	-	3	-	-	53	97	0.570	3,984	1,840	57	1,730	5	0.316	3,026
Southern California, University of	Private	18,477	7,035	0.381	2,127	377	342	53	-	98	66	0.115	20,589	8,727	1,493	4,941	1,098	0.298	4,103
Stanford University	Private	9,934	3,200	0.322	3,145	817	599	181	-	-	4	0.317	43,352	28,938	9,104	8,657	7,842	0.400	9,201
Class B																		
California State College at Los Angeles	Public	18,557	3,683	0.198	601	506	38	-	-	-	-	0.032	11,970	196	15	77	104	0.016	326
California State Polytechnic College	Public	9,297	149	0.016	724	709	6	-	-	-	-	0.078	10,867	20	-	-	20	0.002	28
California, University of - Santa Barbara	Public	4,787	191	0.040	229	189	16	-	-	-	-	0.048	7,891	949	370	120	338	0.107	4,144
Chico State College	Public	3,910	57	0.015	178	168	4	-	-	-	-	0.046	4,652	57	-	32	25	0.012	320
Fresno State College	Public	8,663	491	0.057	328	278	20	-	-	-	-	0.038	7,227	164	-	14	150	0.022	500
The Holy Names, College of	Denom.	1,062	19	0.018	41	33	3	-	-	-	-	0.039	725	13	-	-	13	0.018	317
Humboldt State College	Public	2,782	138	0.050	113	98	6	-	-	-	-	0.041	3,328	132	-	18	114	0.038	1,168

(California continued next page)

* Estimated

S&T DP = Science and Technology Degree Productivity
R_e = Graduate student enrollment/total enrollment
R_s^e = Science and technology degree productivity/total enrollment
R_{fe} = Federal funds for academic science/total institutional income
R_{fd} = Federal funds for academic science/science and technology degree productivity
EGI = Educational and General Income
FFAS = Federal Funds for Academic Science

Table A-1.—Continued

A-1.2

		Enrollment				Degrees							Dollars in Thousands						
	Control	Total	Graduate	R_e	S&T DP	BA	MA	PhD	DVM	DDS	MD	R_s	EGI	FFAS	DOD	USPHS	NSF	R_{fe}	R_{fd}
CALIFORNIA (Cont'd)																			
Immaculate Heart College	Denom.	1,460	104	0.071	50	45	2	-	-	-	-	0.034	1,089	94	-	65	29	0.079	1,880
Long Beach State College	Public	12,889	1,426	0.111	377	322	22	-	-	-	-	0.029	9,037	233	-	112	121	0.025	618
Mills College	Private	759	48	0.063	53	48	2	-	-	-	-	0.070	1,281	3	-	-	3	0.002	57
Occidental College	Private	1,530	32	0.021	153	143	4	-	-	-	-	0.100	2,511	55	-	9	36	0.021	359
Pacific Union College	Denom.	1,238	35	0.028	31	28	1	-	-	-	-	0.025	1,646	19	-	19	-	0.011	613
Pacific, University of the	Denom.	2,561	276	0.108	123	95	11	-	-	-	-	0.048	2,996	242	10	137	95	0.075	1,967
Sacramento State College	Public	9,251	889	0.096	228	193	14	-	-	-	-	0.025	5,758	213	-	56	157	0.036	934
San Diego State College	Public	14,661	1,772	0.121	569	419	60	-	-	-	-	0.039	10,886	804	10	171	596	0.069	1,413
San Fernando Valley State College	Public	9,045	1,239	0.137	143	140	1	-	-	-	-	0.016	6,356	227	-	100	127	0.034	1,587
San Francisco State College	Public	17,024	1,891	0.111	429	334	38	-	-	-	-	0.025	11,237	400	13	125	206	0.034	932
San Francisco, University of	Denom.	4,363	117	0.027	113	105	3	-	-	-	-	0.026	2,493	243	-	177	66	0.089	2,150
San Jose State College	Public	20,354	1,681	0.083	821	596	90	-	-	-	-	0.040	15,136	625	18	103	504	0.040	761
Santa Clara, University of	Denom.	3,544	1,252	0.353	152	104	19	-	-	-	-	0.043	2,579	107	-	-	107	0.040	704
Whittier College	Private	1,551	53	0.034	168	165	1	-	-	-	-	0.108	1,795	14	-	3	11	0.008	83
Class C																			
California State College at Hayward	Public	1,788	918	0.513	12	12	-	-	-	-	-	0.007	2,090	151	-	-	151	0.067	12,583
Chapman College	Denom.	1,081	222	0.205	13	13	-	-	-	-	-	0.012	652	17	-	3	14	0.025	1,308
Claremont Men's College	Private	515	-	0	31	31	-	-	-	-	-	0.060	1,035	17	5	-	-	0.016	548
Dominican College of San Rafael	Denom.	743	30	0.040	14	14	-	-	-	-	-	0.019	324	16	-	-	16	0.047	1,143
Harvey Mudd College	Private	257	-	0	33	33	-	-	-	-	-	0.128	859	139	-	-	139	0.139	4,212
La Sierra College	Denom.	1,161	33	0.028	39	39	-	-	-	-	-	0.034	1,003	11	-	-	11	0.011	282
Loyola University of Los Angeles	Denom.	1,917	164	0.086	133	133	-	-	-	-	-	0.069	2,237	16	-	13	3	0.007	120
Mount St. Mary's College	Denom.	1,344	24	0.018	32	32	-	-	-	-	-	0.024	908	75	-	49	26	0.076	2,344
Orange State College	Public	2,538	-	0	42	42	-	-	-	-	-	0.017	1,876	36	-	28	8	0.019	857
Pomona College	Private	1,074	-	0	156	156	-	-	-	-	-	0.145	2,459	325	-	133	192	0.117	2,083

Redlands, University of	Denom.	1,557	109	0.070	157	157	-	-	-	-	-	0.101	2,431	69	-	-	69	0.028	439
St. Mary's College of California	Denom.	852	3	0.004	43	43	-	-	-	-	-	0.050	989	24	-	10	14	0.024	558
Westmont College	Private	526	-	0	22	22	-	-	-	-	-	0.042	650	17	-	17	-	0.025	773
Class D																			
Pacific Oaks College	Private	54	-	0	-	-	-	-	-	-	-	0.000	86	32	32	-	-	0.271	-
COLORADO																			
Class A																			
Colorado School of Mines	Public	1,042	77	0.074	203	133	26	1	-	-	-	0.195	2,405	254	56	-	103	0.096	1,251
Colorado State University	Public	7,304	572	0.078	896	447	94	19	58	-	-	0.123	13,889	2,944	228	981	794	0.175	3,286
Colorado, University of	Public	19,557	2,030	0.104	1,843	672	211	71	-	-	81	0.094	26,131	11,473	1,163	5,044	4,322	0.305	6,225
Denver, University of	Denom.	5,876	1,049	0.179	308	177	45	4	-	-	-	0.052	8,215	2,885	2,165	231	102	0.260	9,367
Class B																			
Colorado College	Private	1,385	29	0.021	184	124	24	-	-	-	-	0.133	2,418	171	-	12	159	0.066	929
Colorado State College	Public	4,791	320	0.067	166	88	31	-	-	-	-	0.035	3,798	447	-	28	145	0.105	2,693
Western State College of Colorado	Public	1,872	48	0.026	55	50	2	-	-	-	-	0.029	1,500	14	-	-	9	0.009	255
Class C																			
Loretto Heights College	Denom.	832	-	0	13	13	-	-	-	-	-	0.016	1,347	81	-	34	47	0.057	6,231
Regis College	Denom.	993	-	0	44	44	-	-	-	-	-	0.044	1,035	15	-	15	-	0.014	341
CONNECTICUT																			
Class A																			
Connecticut, University of	Public	13,070	1,694	0.130	1,023	544	139	29	-	-	-	0.078	14,552	2,136	182	954	414	0.128	2,088
Yale University	Private	8,364	2,436	0.291	1,868	460	231	117	-	-	76	0.223	34,378	19,472	1,900	9,596	3,497	0.362	10,424
Class B																			
Central Connecticut State College	Public	4,302	716	0.166	49	44	2	-	-	-	-	0.011	2,880	51	-	-	51	0.017	1,041
Connecticut College	Private	1,367	36	0.026	107	79	11	-	-	-	-	0.078	2,272	37	-	13	24	0.016	346
Saint Joseph College	Denom.	828	103	0.124	33	25	3	-	-	-	-	0.040	412	52	17	3	32	0.112	1,576
Trinity College	Private	1,477	430	0.291	171	106	26	-	-	-	-	0.116	2,682	43	-	13	30	0.016	251
Wesleyan University	Private	1,146	116	0.101	220	107	45	-	-	-	-	0.192	6,102	487	2	40	445	0.074	2,214

(Connecticut continued next page)

Table A-1.—Continued

CONNECTICUT (Cont'd)	Control	Enrollment		R_e	S&T DP	Degrees						R_g	Dollars in Thousands					R_{fe}	R_{fd}
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
Class C																			
Albertus Magnus College	Denom.	446	-	0	35	35	-	-	-	-	-	0.078	443	12	-	-	12	0.026	343
Bridgeport, University of	Private	6,300	871	0.138	131	131	-	-	-	-	-	0.021	3,716	164	-	86	78	0.042	1,252
Fairfield University	Denom.	2,155	786	0.365	164	164	-	-	-	-	-	0.076	1,430	26	-	1	25	0.018	159
Hartford, University of	Private	7,103	1,259	0.177	95	95	-	-	-	-	-	0.013	3,542	8	-	8	-	0.002	84
DELAWARE																			
Class A																			
Delaware, University of	Public	7,225	981	0.136	551	243	84	22	-	-	-	0.076	8,633	1,619	360	150	424	0.158	2,938
DISTRICT OF COLUMBIA																			
Class A																			
The American University	Denom.	9,181	1,327	0.145	373	156	56	17	-	-	-	0.041	7,917	1,016	669	90	205	0.114	2,724
The Catholic University of America	Denom.	5,177	2,202	0.425	602	140	120	36	-	-	-	0.116	5,495	2,768	752	1,087	486	0.335	4,598
Georgetown University	Denom.	6,791	1,132	0.167	1,119	179	57	27	-	72	97	0.165	18,000	3,960	154	3,226	253	0.180	3,539
George Washington University	Private	14,031	2,892	0.206	1,114	266	163	17	-	-	91	0.079	16,700	4,372	1,873	1,790	230	0.207	3,925
Howard University	Public	6,288	593	0.094	1,131	322	47	7	-	70	95	0.180	11,371	1,822	103	1,412	226	0.138	1,611
Class C																			
Dunbarton College of Holy Cross	Denom.	486	-	0	22	22	-	-	-	-	-	0.045	543	4	-	-	4	0.007	182
Gallaudet College	Private	444	31	0.070	16	16	-	-	-	-	-	0.036	1,811	34	-	-	11	0.018	2,125
FLORIDA																			
Class A																			
Florida State University	Public	10,391	1,452	0.140	597	246	72	38	-	-	-	0.057	12,303	4,848	873	1,032	1,034	0.283	8,121
Florida, University of	Public	13,826	2,040	0.148	1,728	821	187	62	-	-	40	0.125	40,810	8,278	902	4,491	1,452	0.169	4,791
Miami, University of	Private	12,053	797	0.066	859	435	49	11	-	-	63	0.071	15,261	6,822	1,412	3,515	1,351	0.309	7,942
Class B																			
Rollins College	Private	2,013	321	0.159	71	58	5	-	-	-	-	0.035	2,253	49	-	-	49	0.021	690
Stetson (John B.) University	Denom.	2,078	155	0.075	58	53	2	-	-	-	-	0.028	2,324	112	-	-	82	0.046	1,931
Class C																			
Barry College	Denom.	818	70	0.086	13	13	-	-	-	-	-	0.016	580	6	-	4	2	0.010	462
Florida Agricultural and Mechanical University	Public	3,149	246	0.078	98	98	-	-	-	-	-	0.031	3,742	54	-	-	54	0.014	551

Florida Southern College	Denom.	2,640	-	0	73	73	-	-	-	-	-	0.028	1,907	25	-	4	21	0.013	342
Jacksonville University	Private	2,099	-	0	33	33	-	-	-	-	-	0.016	1,372	7	-	-	7	0.005	212
Tampa, University of	Private	2,489	-	0	38	38	-	-	-	-	-	0.015	1,429	9	-	7	2	0.006	237
GEORGIA																			
Class A																			
Emory University	Denom.	4,646	557	0.120	960	227	39	14	-	73	70	0.207	7,334	4,984	37	4,530	270	0.405	5,192
Georgia Institute of Technology	Public	6,876	651	0.095	1,093	614	136	31	-	-	-	0.159	8,789	3,198	1,168	583	456	0,267	2,926
Georgia, Medical College of	Public	457	88	0.193	362	-	4	-	-	-	88	0.792	2,050	1,575	-	1,575	-	0.434	4,351
Georgia, The University of	Public	12,247	948	0.077	1,025	527	118	24	43	-	-	0.084	22,020	3,332	113	648	968	0.131	3,251
Class B																			
Atlanta University	Private	727	727	0	145	-	58	-	-	-	-	0.199	1,047	423	-	92	331	0.288	2,917
Georgia Southern College	Public	2,121	159	0.075	58	50	3	-	-	-	-	0.027	1,402	8	-	-	8	0.006	138
Class C																			
Agnes Scott College	Private	667	-	0	44	44	-	-	-	-	-	0.066	1,166	6	-	6	-	0.005	136
Albany State College	Public	1,001	-	0	12	12	-	-	-	-	-	0.012	839	81	-	-	81	0.088	6,750
Georgia State College	Public	3,873	157	0.041	121	121	-	-	-	-	-	0.031	2,652	10	-	-	-	0.004	83
Lagrange College	Denom.	471	-	0	15	15	-	-	-	-	-	0.032	400*	3	-	-	3	0.007	200
Morehouse College	Private	810	-	0	97	97	-	-	-	-	-	0.120	756	35	-	-	35	0.044	361
North Georgia College	Public	886	-	0	35	35	-	-	-	-	-	0.040	703	10	-	-	3	0.014	286
Savannah State College	Public	1,160	-	0	35	35	-	-	-	-	-	0.030	1,069	27	-	-	27	0.025	771
Shorter College	Denom.	665	-	0	22	22	-	-	-	-	-	0.033	660	19	-	-	19	0.028	864
Spelman College	Denom.	596	-	0	48	48	-	-	-	-	-	0.081	753	4	-	4	-	0.005	83
HAWAII																			
Class A																			
Hawaii, University of	Public	11,575	761	0.066	696	333	118	15	-	-	-	0.060	15,374	3,332	355	763	1,310	0.178	4,787
IDAHO																			
Class B																			
Idaho State University	Public	2,644	96	0.036	62	59	1	-	-	-	-	0.023	3,867	134	-	27	98	0.033	2,161
Idaho, University of	Public	5,254	313	0.060	549	316	93	-	-	-	-	0.104	9,266	966	-	40	332	0.094	1,760

(Idaho continued next page)

Table A–1.—Continued

A-1.4

		Enrollment				Degrees							Dollars in Thousands						
	Control	Total	Graduate	R_e	S&T DP	BA	MA	PhD	DVM	DDS	MD	R_g	EGI	FFAS	DOD	USPHS	NSF	R_{fe}	R_{fi}
IDAHO (Cont'd)																			
Class C																			
Idaho, The College of	Denom.	955	42	0.044	44	44	-	-	-	-	-	0.046	972	11	-	-	11	0.011	250
Northwest Nazarene College	Denom.	793	-	0	13	13	-	-	-	-	-	0.016	580	10	-	-	10	0.017	769
ILLINOIS																			
Class A																			
Chicago, The University of	Private	8,233	2,853	0.347	1,977	289	267	169	-	-	65	0.240	22,375	24,668	4,677	11,270	5,111	0.524	12,477
Illinois Institute of Technology	Private	7,109	1,318	0.185	915	480	100	41	-	-	-	0.129	5,985	2,368	638	370	739	0.283	2,588
Illinois, University of	Public	33,956	5,325	0.157	6,105	1,611	774	318	31	77	188	0.180	107,666	28,788	8,414	8,448	5,961	0.211	4,715
Loyola University	Denom.	10,354	1,198	0.116	1,023	249	28	8	-	94	73	0.099	8,742	1,297	28	1,154	20	0.129	1,268
Northwestern University	Private	16,636	1,551	0.093	2,301	528	195	107	-	68	133	0.138	24,175	11,179	3,208	5,316	1,739	0.316	4,858
Southern Illinois University	Public	16,843	1,301	0.077	715	468	88	6	-	-	-	0.042	21,916	772	40	320	346	0.034	1,080
Class B																			
Bradley University	Private	4,705	316	0.067	276	201	30	-	-	-	-	0.059	3,862	115	-	-	115	0.029	417
Chicago Teachers College South	Public	5,727	675	0.118	60	25	14	-	-	-	-	0.010	2,073	2	-	-	2	0.001	33
De Paul University	Denom.	9,147	1,224	0.134	209	104	42	-	-	-	-	0.023	4,484	140	-	-	26	0.030	670
Illinois State University at Normal	Public	6,571	395	0.060	154	104	20	-	-	-	-	0.023	7,544	27	-	-	7	0.004	175
Mac Murray College	Denom.	971	7	0.007	49	39	4	-	-	-	-	0.050	1,400	11	-	-	11	0.008	224
Northern Illinois University	Public	9,863	1,790	0.181	285	192	37	-	-	-	-	0.029	9,887	240	-	67	136	0.024	842
Roosevelt University	Private	5,909	628	0.106	249	214	14	-	-	-	-	0.042	3,522	75	-	19	56	0.021	301
Western Illinois University	Public	4,146	115	0.028	117	99	7	-	-	-	-	0.028	5,032	23	-	-	23	0.005	197
Class C																			
Eastern Illinois University	Public	3,664	160	0.044	92	92	-	-	-	-	-	0.025	4,426	84	-	-	84	0.019	913
Illinois Wesleyan University	Denom.	1,181	61	0.052	39	39	-	-	-	-	-	0.033	1,582	107	-	32	75	0.063	2,744
Knox College	Private	1,140	-	0	122	122	-	-	-	-	-	0.107	2,010	131	-	2	129	0.061	1,074
Lake Forest University	Denom.	1,224	-	0	84	84	-	-	-	-	-	0.069	1,837	42	-	-	42	0.022	500
Millikin University	Denom.	1,750	53	0.030	43	43	-	-	-	-	-	0.025	1,605	26	-	8	18	0.016	605
Mundelein College	Denom.	1,226	-	0	103	103	-	-	-	-	-	0.084	1,443	11	-	11	-	0.008	107

North Central College	Denom.	931	-	0	65	65	-	-	-	-	-	0.070	1,297	16	-	-	16	0.012	246
Olivet Nazarene College	Denom.	1,197	-	0	34	34	-	-	-	-	-	0.028	800	5	-	-	5	0.006	147
Principia College	Private	551	-	0	54	54	-	-	-	-	-	0.098	1,048	2	-	-	2	0.002	37
Rockford College	Private	1,074	25	0.023	32	32	-	-	-	-	-	0.030	1,084	7	-	-	7	0.006	219
Rosary College	Denom.	1,107	-	0	44	44	-	-	-	-	-	0.040	1,477	5	-	-	5	0.003	114
St. Procopius College	Denom.	656	-	0	47	47	-	-	-	-	-	0.072	426	98	-	2	17	0.187	2,085
St. Xavier College	Denom.	1,199	21	0.018	24	24	-	-	-	-	-	0.020	800*	123	-	121	2	0.133	5,125
Wheaton College	Private	1,913	82	0.043	143	143	-	-	-	-	-	0.075	2,645	6	-	-	6	0.002	42
Class D																			
George Williams College	Private	416	82	0.197	-	-	-	-	-	-	-	0.000	636	7	-	-	-	0.011	-
INDIANA																			
Class A																			
Indiana University	Public	31,581	3,694	0.117	2,226	462	152	103	-	77	153	0.070	39,176	9,880	824	6,327	1,968	0.201	4,438
Notre Dame, University of	Denom.	6,717	791	0.118	1,239	614	176	41	-	-	-	0.184	14,125	2,529	574	427	1,107	0.152	2,041
Purdue University	Public	22,316	3,099	0.139	4,479	1,555	671	255	44	-	-	0.201	39,765	9,265	1,865	2,004	2,996	0.189	2,069
Class B																			
Ball State Teachers College	Public	8,526	1,289	0.151	163	100	25	-	-	-	-	0.019	7,939	179	-	7	89	0.022	1,098
Butler University	Private	4,201	1,063	0.253	63	53	4	-	-	-	-	0.015	2,323	28	-	-	28	0.012	444
Depauw University	Private	2,331	46	0.020	254	234	8	-	-	-	-	0.109	3,324	103	-	-	77	0.030	406
Indiana State College	Public	5,941	692	0.116	197	107	36	-	-	-	-	0.033	5,638	7	-	-	7	0.001	36
Rose Polytechnic Institute	Private	526	6	0.011	87	77	4	-	-	-	-	0.165	995	13	-	-	13	0.013	149
Class C																			
Earlham College	Denom.	1,061	11	0.010	103	103	-	-	-	-	-	0.097	1,830	299	-	-	299	0.140	2,903
Evansville College	Private	3,213	-	0	79	79	-	-	-	-	-	0.025	2,028	30	-	25	5	0.015	380
Goshen College	Denom.	1,125	-	0	74	74	-	-	-	-	-	0.066	1,067	15	-	15	-	0.014	203
Hanover College	Denom.	827	-	0	62	62	-	-	-	-	-	0.075	1,014	5	-	-	5	0.005	81
Indiana Central College	Denom.	1,827	-	0	26	26	-	-	-	-	-	0.014	912	7	-	-	7	0.008	269
Indiana Institute of Technology	Private	1,314	-	0	262	262	-	-	-	-	-	0.199	1,008	12	-	-	12	0.012	46

(Indiana continued next page)

Table A–1.—Continued

		Enrollment				Degrees							Dollars in Thousands						
	Control	Total	Graduate	R_e	S&T DP	BA	MA	PhD	DVM	DDS	MD	R_s	EGI	FFAS	DOD	USPHS	NSF	R_{fe}	R_{fd}
																		A-1.5	
INDIANA (Cont'd)																			
Manchester College	Denom.	1,217	-	0	76	76	-	-	-	-	-	0.062	1,189	26	-	-	26	0.021	342
Marian College	Denom.	787	-	0	6	6	-	-	-	-	-	0.008	335	3	-	-	3	0.009	500
St. Mary's College	Denom.	1,192	18	0.015	43	43	-	-	-	-	-	0.036	1,506	4	-	4	-	0.003	93
Taylor University	Private	831	-	0	43	43	-	-	-	-	-	0.052	785	7	-	-	-	0.009	163
Valparaiso University	Denom.	3,233	-	0	200	200	-	-	-	-	-	0.062	3,580	111	-	14	97	0.030	555
Wabash College	Private	802	-	0	85	85	-	-	-	-	-	0.106	1,479	124	-	31	79	0.077	1,459
IOWA																			
Class A																			
Iowa State University of Science and Technology	Public	10,887	1,660	0.152	2,173	862	210	166	57	-	-	0.200	20,631	4,583	276	1,092	931	0.182	2,109
Iowa, University of	Public	12,114	2,558	0.211	2,081	548	188	85	-	53	117	0.172	32,765	7,294	609	5,053	972	0.182	3,505
Class B																			
Drake University	Private	7,180	409	0.057	199	154	18	-	-	-	-	0.028	3,977	185	-	-	185	0.044	930
State College of Iowa	Public	5,075	226	0.045	213	123	36	-	-	-	-	0.042	4,805	407	-	-	374	0.078	1,911
Class C																			
Central College	Denom.	616	-	0	43	43	-	-	-	-	-	0.070	724	31	-	31	-	0.041	721
Coe College	Private	1,113	-	0	57	57	-	-	-	-	-	0.051	1,375	33	-	-	33	0.023	579
Cornell College	Private	790	-	0	57	57	-	-	-	-	-	0.072	1,416	23	-	10	13	0.016	404
Dubuque, University of	Denom.	865	-	0	37	37	-	-	-	-	-	0.043	1,101	4	-	4	-	0.004	108
Grinnell College	Private	1,186	-	0	128	128	-	-	-	-	-	0.108	2,639	148	-	39	109	0.053	1,156
Loras College	Denom.	1,386	-	0	91	91	-	-	-	-	-	0.066	1,100 *	9	-	-	9	0.008	99
Luther College	Denom.	1,324	-	0	54	54	-	-	-	-	-	0.041	1,558	16	-	-	-	0.010	296
Marycrest College	Denom.	923	-	0	14	14	-	-	-	-	-	0.015	532	4	-	-	4	0.007	286
Morningside College	Denom.	1,519	-	0	46	46	-	-	-	-	-	0.030	1,353	9	-	-	9	0.007	196
Parsons College	Denom.	2,226	-	0	106	106	-	-	-	-	-	0.048	2,756	54	-	45	9	0.019	509
Simpson College	Denom.	742	-	0	42	42	-	-	-	-	-	0.057	968	21	-	-	21	0.021	500

KANSAS																			
Class A																			
Kansas State University	Public	8,909	959	0.108	1,351	509	234	27	62	-	-	0.152	16,305	2,718	253	356	522	0.143	2,012
Kansas, University of	Public	11,434	1,878	0.164	1,567	458	178	63	-	-	95	0.137	18,363	6,149	402	3,644	1,368	0.251	3,924
Class B																			
Fort Hays Kansas State College	Public	3,469	270	0.078	167	107	24	-	-	-	-	0.048	2,857	72	-	-	72	0.025	431
Kansas State College of Pittsburg	Public	3,651	324	0.089	201	118	33	-	-	-	-	0.055	3,729	208	-	-	208	0.053	1,035
Kansas State Teachers College of Emporia	Public	5,112	732	0.143	289	114	70	-	-	-	-	0.057	4,088	564	-	18	546	0.121	1,952
Wichita State University	Public	6,033	715	0.119	293	173	48	-	-	-	-	0.049	4,002	162	73	28	22	0.039	553
Class C																			
Bethel College	Denom.	483	-	0	22	22	-	-	-	-	-	0.046	461	3	-	-	3	0.006	136
Kansas Wesleyan University	Denom.	580	-	0	19	19	-	-	-	-	-	0.033	548	5	-	-	5	0.009	263
Mount St. Scholastica College	Denom.	419	-	0	22	22	-	-	-	-	-	0.053	477	2	-	-	2	0.004	91
St. Benedict's College	Denom.	730	-	0	63	63	-	-	-	-	-	0.086	694	4	-	-	4	0.006	63
Washburn University of Topeka	Public	3,525	68	0.019	70	70	-	-	-	-	-	0.020	1,725	99	25	9	65	0.054	1,414
KENTUCKY																			
Class A																			
Kentucky, University of	Public	11,242	1,035	0.092	747	423	97	18	-	-	-	0.066	26,828	6,312	224	1,899	485	0.190	8,450
Louisville, University of	Public	6,652	629	0.095	931	222	44	13	-	47	88	0.140	8,761	2,825	152	2,294	269	0.244	3,034
Class C																			
Asbury College	Private	925	-	0	52	52	-	-	-	-	-	0.056	1,500*	28	-	-	28	0.018	538
Bellarmine College	Denom.	1,441	-	0	33	33	-	-	-	-	-	0.023	863	11	-	4	7	0.013	333
Berea College	Private	1,337	-	0	75	75	-	-	-	-	-	0.056	2,010	18	-	15	3	0.009	240
Brescia College	Denom.	900	-	0	9	9	-	-	-	-	-	0.010	291	4	-	-	4	0.014	444
Centre College of Kentucky	Private	541	-	0	25	25	-	-	-	-	-	0.046	816	25	-	7	18	0.030	1,000
Eastern Kentucky State College	Public	4,155	373	0.090	81	81	-	-	-	-	-	0.019	3,800*	46	-	-	46	0.012	568
Kentucky State College	Public	868	-	0	41	41	-	-	-	-	-	0.047	1,083	16	-	-	16	0.015	390
Morehead State College	Public	2,974	116	0.039	60	60	-	-	-	-	-	0.020	2,612	6	-	-	-	0.002	100
Murray State College	Public	3,609	198	0.055	116	116	-	-	-	-	-	0.032	3,354	99	-	5	94	0.029	853
Nazareth College of Kentucky	Denom.	409	-	0	5	5	-	-	-	-	-	0.012	632	33	-	33	-	0.050	6,600
Villa Madonna College	Denom.	1,387	-	0	38	38	-	-	-	-	-	0.027	543	19	-	-	19	0.034	500
Western Kentucky State College	Public	5,305	358	0.067	141	141	-	-	-	-	-	0.027	3,338	117	-	-	117	0.034	830

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Table A-1.—Continued

	Control	Enrollment Total	Enrollment Graduate	R_g	S&T DP	Degrees BA	Degrees MA	Degrees PhD	Degrees DVM	Degrees DDS	Degrees MD	R_s	Dollars in Thousands EGI	Dollars in Thousands FFAS	Dollars in Thousands DOD	Dollars in Thousands USPHS	Dollars in Thousands NSF	R_{Dr}	R_{Da}
LOUISIANA																			
Class A																			
Louisiana State University and Agricultural & Mechanical College	Public	18,338	2,002	0.109	1,931	599	204	83	-	-	112	0.105	27,525	5,564	526	2,647	1,192	0.168	2,881
Loyola University	Denom.	2,718	118	0.043	250	38	-	-	-	53	-	0.092	913	250	-	154	96	0.215	1,000
Tulane University	Private	7,107	1,095	0.154	1,001	245	58	30	-	-	119	0.141	17,503	8,286	231	7,023	574	0.321	8,278
Class B																			
Louisiana Polytechnic Institute	Public	3,916	202	0.052	348	240	43	-	-	-	-	0.089	3,881	102	-	-	102	0.026	293
McNeese State College	Public	3,031	132	0.044	66	63	1	-	-	-	-	0.022	2,073	10	-	-	10	0.005	152
Northwestern State College of Louisiana	Public	3,468	189	0.054	125	90	14	-	-	-	-	0.036	2,900	60	-	44	16	0.020	480
Southeastern Louisiana College	Public	3,005	41	0.014	66	61	2	-	-	-	-	0.022	2,160	41	-	29	12	0.019	621
Southern University and Agricultural & Mechanical College	Public	5,703	327	0.057	155	145	4	-	-	-	-	0.027	4,271	174	-	17	148	0.039	1,123
Southwestern Louisiana, The University of	Public	5,969	121	0.020	279	249	12	-	-	-	-	0.047	4,820	294	-	14	260	0.057	1,054
Class C																			
Centenary College of Louisiana	Denom.	1,664	-	0	25	25	-	-	-	-	-	0.015	1,094	14	-	-	11	0.013	560
Dillard University	Private	882	-	0	47	47	-	-	-	-	-	0.053	1,022	56	-	17	39	0.052	1,191
Grambling College	Public	3,049	-	0	29	29	-	-	-	-	-	0.010	2,652	88	-	-	77	0.032	3,034
Louisiana College	Denom.	1,044	-	0	26	26	-	-	-	-	-	0.025	693	8	-	-	8	0.011	308
Northeast Louisiana State College	Public	3,315	219	0.066	56	56	-	-	-	-	-	0.017	2,336	47	-	-	47	0.020	839
St. Mary's Dominican College	Denom.	418	-	0	12	12	-	-	-	-	-	0.029	620	7	-	-	7	0.011	583
Xavier University of Louisiana	Denom.	800	31	0.039	23	23	-	-	-	-	-	0.029	860	10	-	-	10	0.011	435
MAINE																			
Class A																			
Maine, University of	Public	6,746	177	0.026	502	402	38	1	-	-	-	0.074	8,098	1,002	20	114	237	0.110	1,996
Class B																			
Bowdoin College	Private	817	10	0.012	172	117	22	-	-	-	-	0.211	2,779	212	-	10	202	0.071	1,233
Class C																			
Bates College	Private	894	-	0	120	120	-	-	-	-	-	0.134	1,479	20	-	-	20	0.013	167
Colby College	Private	1,256	-	0	112	112	-	-	-	-	-	0.089	2,497	96	-	-	96	0.037	897
Nasson College	Private	477	-	0	18	18	-	-	-	-	-	0.038	542	20	-	-	20	0.036	1,111

MARYLAND																			
Class A																			
Johns Hopkins University	Private	8,240	1,565	0.190	1,181	354	79	75	-	-	73	0.143	14,243	22,632	3,434	14,681	2,997	0.614	19,153
Maryland, University of	Public	25,361	4,555	0.180	2,099	658	137	85	-	94	85	0.083	32,656	12,849	2,144	5,385	1,219	0.282	6,121
Class C																			
Columbia Union College	Denom.	893	-	0	19	19	-	-	-	-	-	0.021	776	110	-	110	-	0.124	5,789
Goucher College	Private	853	-	0	53	53	-	-	-	-	-	0.062	1,328	180	-	34	146	0.119	3,396
Hood College	Private	670	-	0	30	30	-	-	-	-	-	0.045	856	5	-	-	5	0.006	167
Loyola College	Denom.	1,973	208	0.105	81	81	-	-	-	-	-	0.041	1,093	30	12	5	13	0.027	370
Maryland State College (Princess Ann)	Public	519	-	0	21	21	-	-	-	-	-	0.040	896	9	-	9	-	0.010	429
Morgan State College	Public	2,699	-	0	140	140	-	-	-	-	-	0.052	2,589	148	-	-	113	0.054	1,057
Notre Dame of Maryland, College of	Denom.	1,027	-	0	49	49	-	-	-	-	-	0.048	533	8	-	8	-	0.015	163
St. Joseph College	Denom.	579	-	0	20	20	-	-	-	-	-	0.035	549	41	-	30	11	0.069	2,050
Washington College	Private	486	-	0	50	50	-	-	-	-	-	0.103	677	11	-	11	-	0.016	220
Western Maryland College	Public	983	364	0.370	90	90	-	-	-	-	-	0.092	851	45	-	-	45	0.050	500
MASSACHUSETTS																			
Class A																			
Boston University	Private	19,589	1,551	0.079	1,212	479	124	29	-	-	73	0.062	18,436	5,433	94	4,792	351	0.228	4,483
Brandeis University	Private	1,751	359	0.205	343	179	28	21	-	-	-	0.196	5,911	3,690	290	1,475	1,452	0.384	10,758
Clark University	Private	2,039	222	0.109	248	120	31	11	-	-	-	0.122	2,256	985	-	744	138	0.304	3,972
Harvard University	Private	13,646	3,618	0.265	3,119	770	273	244	-	11	131	0.229	54,824	31,251	3,264	20,326	6,308	0.363	10,020
Lowell Technological Institute	Public	1,451	65	0.045	204	134	26	1	-	-	-	0.141	2,000	856	848	-	8	0.300	4,196
Massachusetts Institute of Technology	Private	6,695	2,637	0.394	3,503	739	616	272	-	-	-	0.523	19,332	42,361	23,935	7,618	5,567	0.687	12,093
Massachusetts, University of	Public	7,223	967	0.134	976	566	117	26	-	-	-	0.135	13,971	1,925	266	723	327	0.121	1,972
Tufts University	Private	4,586	520	0.113	1,246	380	10	10	-	89	110	0.272	7,208	4,083	406	2,906	433	0.362	3,277
Worcester Polytechnic Institute	Private	1,368	165	0.121	361	212	56	2	-	-	-	0.264	2,470	278	-	10	183	0.101	770

(Massachusetts continued next page)

Table A-1.—Continued

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	Control	Enrollment		R_e	S&T DP	Degrees						R_s	Dollars in Thousands					R_{fs}	R_{fa}
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
MASSACHUSETTS (Cont'd)																			
Class B																			
Boston College	Denom.	8,902	1,358	0.153	569	401	67	-	-	-	-	0.064	8,759	1,955	794	471	520	0.182	3,436
Holy Cross, College of the	Denom.	1,827	11	0.006	211	183	11	-	-	-	-	0.115	2,212	191	-	-	191	0.079	905
Mount Holyoke College	Private	1,644	41	0.025	179	161	7	-	-	-	-	0.109	3,224	109	-	70	39	0.033	609
Northeastern University	Private	19,664	2,263	0.115	1,012	517	198	-	-	-	-	0.051	9,841	1,717	1,212	41	357	0.149	1,697
Simmons College	Private	1,591	86	0.054	84	81	1	-	-	-	-	0.053	2,424	295	-	224	71	0.108	3,512
Smith College	Private	2,375	146	0.061	156	141	6	-	-	-	-	0.066	5,633	354	-	258	96	0.059	2,269
Wellesley College	Private	1,741	10	0.006	170	155	6	-	-	-	-	0.098	6,331	129	-	58	71	0.020	759
Williams College	Private	1,228	64	0.052	184	129	22	-	-	-	-	0.150	3,291	109	-	16	72	0.032	592
Class C																			
Amherst College	Private	1,047	2	0.002	114	114	-	-	-	-	-	0.109	4,213	346	-	154	169	0.076	3,035
Anna Maria College for Women	Denom.	484	-	0	19	19	-	-	-	-	-	0.039	486	2	-	-	2	0.004	105
Assumption College	Denom.	614	106	0.173	12	12	-	-	-	-	-	0.020	782	18	-	-	18	0.023	1,500
Atlantic Union College	Denom.	554	-	0	18	18	-	-	-	-	-	0.032	469	8	-	-	8	0.017	444
Eastern Nazarene College	Denom.	793	-	0	30	30	-	-	-	-	-	0.038	620	46	-	21	25	0.069	1,533
Emmanuel College	Denom.	1,147	-	0	101	101	-	-	-	-	-	0.088	849	238	238	-	-	0.219	2,356
Gordon College and Gordon Divinity School	Private	594	-	0	17	17	-	-	-	-	-	0.029	551	2	-	-	2	0.004	118
Merrimack College	Denom.	2,297	-	0	82	82	-	-	-	-	-	0.036	1,141	19	-	-	19	0.016	232
Regis College	Denom.	709	-	0	104	104	-	-	-	-	-	0.147	[illegible]	206	192	4	5	0.242	1,981
Springfield College	Private	1,701	272	0.160	57	57	-	-	-	-	-	0.034	2,142	45	-	45	-	0.021	789
State College at Bridgewater	Public	2,775	1,143	0.412	17	17	-	-	-	-	-	0.006	1,080	37	-	-	37	0.033	2,176
Stonehill College	Denom.	934	-	0	52	52	-	-	-	-	-	0.056	821	44	-	-	44	0.051	846
Wheaton College	Private	848	-	0	66	66	-	-	-	-	-	0.078	1,604	33	3	4	26	0.020	500
Class D																			
State College at Salem	Public	2,582	524	0.203	-	-	-	-	-	-	-	0.000	1,162	15	-	-	15	0.013	-

MICHIGAN																			
Class A																			
Detroit, University of	Denom.	10,345	1,280	0.124	907	410	90	-	-	68	-	0.088	6,540	414	11	156	247	0.060	456
Michigan State University	Public	28,826	3,983	0.138	2,658	1,030	385	123	50	-	-	0.092	41,247	6,184	369	1,448	2,047	0.130	2,327
Michigan, The University of	Public	30,152	7,401	0.245	5,396	1,436	799	237	-	80	169	0.179	58,630	36,796	11,626	13,428	5,016	0.386	6,819
Wayne State University	Public	20,836	4,209	0.202	1,599	543	178	38	-	-	110	0.077	27,309	5,570	253	3,853	1,000	0.169	3,483
Class B																			
Albion College	Denom.	1,408	-	0	130	127	1	-	-	-	-	0.092	1,870	42	-	7	35	0.022	323
Andrews University	Denom.	1,425	122	0.086	36	31	2	-	-	-	-	0.025	2,068	60	-	1	45	0.028	1,667
Eastern Michigan University	Public	7,817	2,366	0.303	202	164	15	-	-	-	-	0.026	5,016	137	-	[illegible]	106	0.027	678
Michigan Technological University	Public	3,693	57	0.015	516	446	28	-	-	-	-	0.140	4,207	215	43	-	145	0.049	417
Northern Michigan University	Public	3,358	145	0.043	96	86	4	-	-	-	-	0.029	3,197	157	-	11	146	0.047	1,635
Siena Heights College	Denom.	643	61	0.095	35	30	2	-	-	-	-	0.054	474	13	-	13	-	0.027	371
Western Michigan University	Public	12,597	1,295	0.103	373	265	43	-	-	-	-	0.030	8,929	303	-	52	238	0.033	812
Class C																			
Alma College	Denom.	907	-	0	43	43	-	-	-	-	-	0.047	1,208	52	-	5	47	0.041	1,209
Calvin College	Denom.	2,537	-	0	144	144	-	-	-	-	-	0.057	1,950	33	-	10	23	0.017	229
Central Michigan University	Public	7,704	469	0.061	267	267	-	-	-	-	-	0.035	5,497	250	-	21	163	0.044	936
Hope College	Denom.	1,561	-	0	131	131	-	-	-	-	-	0.084	1,472	14	-	-	14	0.009	107
Kalamazoo College	Denom.	839	1	0.001	105	105	-	-	-	-	-	0.125	1,007	6	-	-	6	0.006	57
Marygrove College	Denom.	1,108	-	0	84	84	-	-	-	-	-	0.076	1,065	5	-	-	5	0.005	60
Mercy College of Detroit	Denom.	859	-	0	24	24	-	-	-	-	-	0.028	732	36	-	33	3	0.047	1,500
Olivet College	Private	609	-	0	45	45	-	-	-	-	-	0.074	573	1	-	-	1	0.002	22
MINNESOTA																			
Class A																			
Minnesota, University of	Public	45,849	6,010	0.131	4,162	1,470	335	203	46	86	124	0.091	69,781	23,966	2,376	14,215	3,252	0.256	5,758
Class B																			
Bemidji State College	Public	2,221	103	0.046	68	50	7	-	-	-	-	[illegible]	1,552	[illegible]	-	-	37	0.023	544
Mankato State College	Public	6,959	494	0.071	248	195	21	-	-	-	-	0.036	4,541	[illegible]	-	-	20	0.004	81
St. Cloud State College	Public	4,815	309	0.064	107	102	2	-	-	-	-	0.022	3,077	88	-	-	88	0.028	822

(Minnesota continued next page)

Table A–1.—Continued

	Control	Enrollment		R_e	S&T DP	Degrees						R_d	Dollars in Thousands					R_{fe}	R_{fd}
MINNESOTA (Cont'd)		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
Winona State College	Public	2,054	171	0.083	50	37	5	-	-	-	-	0.024	1,308	51	-	-	51	0.038	1,020
Class C																			
Augsburg College	Denom.	1,334	-	0	59	59	-	-	-	-	-	0.044	1,203	13	-	-	13	0.011	220
Carleton College	Private	1,317	-	0	133	133	-	-	-	-	-	0.101	2,605	235	-	19	216	0.083	1,767
Concordia College	Denom.	1,734	-	0	109	109	-	-	-	-	-	0.063	1,748	48	-	-	24	0.027	440
Gustavus Adolphus College	Denom.	1,264	-	0	56	56	-	-	-	-	-	0.044	1,642	12	-	-	12	0.007	214
Hamline University	Denom.	932	-	0	74	74	-	-	-	-	-	0.079	1,354	30	-	19	11	0.022	405
Macalester College	Private	1,695	12	0.007	98	98	-	-	-	-	-	0.058	2,263	133	-	9	124	0.056	1,357
St. Catherine, The College of	Denom.	1,437	-	0	57	57	-	-	-	-	-	0.040	1,575	42	-	42	-	0.026	737
St. John's University	Denom.	1,247	-	0	104	104	-	-	-	-	-	0.083	1,050	25	-	-	25	0.023	240
St. Mary's College	Denom.	1,130	62	0.055	39	39	-	-	-	-	-	0.035	968	80	-	-	80	0.076	2,051
St. Olaf College	Denom.	1,993	-	0	131	131	-	-	-	-	-	0.066	2,519	95	-	6	89	0.036	725
St. Scholastica, College of	Denom.	447	-	0	5	5	-	-	-	-	-	0.011	579	26	-	26	-	0.043	5,200
St. Teresa, College of	Denom.	919	-	0	35	35	-	-	-	-	-	0.038	1,102	29	-	-	29	0.026	829
St. Thomas, College of	Denom.	1,945	100	0.051	95	95	-	-	-	-	-	0.049	1,964	81	-	7	74	0.040	853
MISSISSIPPI																			
Class A																			
Mississippi State University	Public	5,735	389	0.068	692	419	100	5	-	-	-	0.121	12,719	1,792	335	73	250	0.123	2,590
Mississippi, University of	Public	5,874	429	0.073	731	221	87	8	-	-	64	0.124	6,790	3,137	105	2,427	456	0.316	4,291
Southern Mississippi, University of	Public	5,676	380	0.067	257	197	22	1	-	-	-	0.045	3,283	117	15	-	84	0.034	455
Class B																			
Mississippi College	Denom.	1,748	188	0.108	107	82	10	-	-	-	-	0.061	1,145	16	-	-	16	0.014	150
Class C																			
Jackson State College	Public	1,222	3	0.002	25	25	-	-	-	-	-	0.020	1,3[illegible]	66	-	-	66	0.046	2,640
Millsaps College	Denom.	918	-	0	52	52	-	-	-	-	-	0.057	901	20	-	-	20	0.022	385
Mississippi State College for Women	Public	2,060	-	0	40	40	-	-	-	-	-	0.019	1,460	9	-	-	9	0.006	225
Tougaloo Southern Christian College	Denom.	480	-	0	55	55	-	-	-	-	-	0.115	526	19	-	-	19	0.035	345

MISSOURI																			
Class A Missouri, University of	Public	23,204	2,890	0.125	3,174	1,301	357	51	25	109	65	0.137	41,837	5,502	249	2,060	1,467	0.116	1,733
Saint Louis University	Denom.	9,045	1,812	0.200	1,244	331	115	26	-	29	98	0.138	13,265	2,904	481	1,974	278	0.180	2,334
Washington University	Private	14,602	2,081	0.143	1.372	342	120	51	-	49	76	0.094	17,213	12,299	581	9,324	1,592	0.417	8,964
Class B Central Missouri State College	Public	5,689	382	0.067	167	134	13	-	-	-	-	0.029	3,145	119	-	-	119	0.036	713
Northeast Missouri State Teachers College	Public	3,541	367	0.104	129	104	10	-	-	-	-	0.036	2,355	93	-	-	93	0.038	721
Class C Central Methodist College	Denom.	815	-	0	40	40	-	-	-	-	-	0.049	834	10	-	-	10	0.012	250
Lincoln University	Public	1,483	30	0.020	38	38	-	-	-	-	-	0.026	1,410	20	-	-	20	0.014	526
Notre Dame College	Denom.	375	-	0	31	31	-	-	-	-	-	0.083	300*	10	-	10	-	0.032	323
Rockhurst College	Denom.	2,115	-	0	46	46	-	-	-	-	-	0.022	1,068	11	-	-	11	0.010	239
Southeast Missouri State College	Public	3,742	-	0	76	76	-	-	-	-	-	0.020	2,486	65	-	-	65	0.025	855
Southwest Missouri State College	Public	3,584	-	0	114	114	-	-	-	-	-	0.032	2,664	26	-	-	26	0.010	228
Tarkio College	Denom.	556	-	0	27	27	-	-	-	-	-	0.049	559	5	-	-	5	0.009	185
Webster College	Denom.	778	-	0	23	23	-	-	-	-	-	0.030	587	208	-	-	208	0.262	9,043
William Jewell College	Denom.	969	-	0	73	73	-	-	-	-	-	0.075	902	3	-	-	3	0.003	41
MONTANA																			
Class A Montana State College	Public	4,635	268	0.058	513	303	68	9	-	-	-	0.111	6,068	1,504	81	490	257	0.199	2,932
Montana, University of	Public	4,380	220	0.050	301	189	39	3	-	-	-	0.069	4,659	530	-	205	259	0.102	1,761
Class B Montana School of Mines	Public	412	13	0.032	40	30	4	-	-	-	-	0.097	637	68	-	-	68	0.096	1,700
Class C Carroll College	Denom.	853	-	0	32	32	-	-	-	-	-	0.038	743	58	-	58	-	0.072	1,813
Eastern Montana College of Education	Public	1,814	33	0.018	16	16	-	-	-	-	-	0.009	1,481	5	-	-	5	0.003	313

Table A-1.—Continued

A-1.9

	Control	Enrollment		R_e	S&T DP	Degrees						R_s	Dollars in Thousands					R_{fe}	R_{fd}
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
NEBRASKA																			
Class A																			
Creighton University	Denom.	3,313	219	0.066	560	80	11	-	-	41	72	0.169	3,945	615	-	572	27	0.135	1,098
Nebraska, University of	Public	10,401	1,454	0.140	1,522	502	144	47	-	30	82	0.146	22,370	3,874	12	2,185	695	0.148	2,545
Class B																			
Omaha, Municipal University of	Public	8,044	315	0.039	100	80	8	-	-	-	-	0.012	3,650	101	-	-	101	0.027	1,010
Wayne State College	Public	1,536	80	0.052	48	38	4	-	-	-	-	0.031	1,314	6	-	-	6	0.005	125
Class C																			
Chadron State College	Public	1,106	-	0	42	42	-	-	-	-	-	0.038	988	9	-	-	9	0.009	214
Hastings College	Denom.	810	-	0	40	40	-	-	-	-	-	0.049	805	5	-	-	5	0.006	125
Nebraska Wesleyan University	Denom.	1,168	-	0	43	43	-	-	-	-	-	0.037	1,010	88	-	2	86	0.080	2,047
Union College	Denom.	903	-	0	11	11	-	-	-	-	-	0.012	786	52	-	42	10	0.062	4,727
NEVADA																			
Class B																			
Nevada, University of	Public	4,761	200	0.042	246	161	34	-	-	-	-	0.052	6,941	824	-	82	263	0.106	3,350
NEW HAMPSHIRE																			
Class A																			
New Hampshire, University of	Public	3,890	333	0.086	608	293	102	13	-	-	-	0.156	8,027	1,418	324	229	423	0.150	2,332
Class B																			
Dartmouth College	Private	3,404	58	0.017	468	405	25	-	-	-	-	0.137	11,780	3,046	438	1,599	829	0.205	6,509
Class C																			
Rivier College	Denom.	583	45	0.077	13	13	-	-	-	-	-	0.022	523	3	-	3	-	0.006	231
St. Anselm's College	Denom.	1,339	-	0	60	60	-	-	-	-	-	0.045	1,[illegible]54	57	-	57	-	0.038	950
NEW JERSEY																			
Class A																			
Fairleigh Dickinson University	Private	15,901	878	0.055	722	541	15	-	-	36	-	0.045	9,304	165	-	80	52	0.017	229
Princeton University	Private	4,196	958	0.228	1,264	352	140	125	-	-	-	0.301	43,021	10,382	2,726	828	3,297	0.194	8,214
Rutgers--The State University	Public	25,340	4,073	0.161	1,863	924	228	83	-	-	-	0.074	28,314	6,045	470	2,500	2,144	0.176	3,236
Seton Hall University	Denom.	9,087	1,750	0.193	601	179	12	-	-	30	68	0.066	5,231	2,875	52	2,585	191	0.355	4,784
Stevens Institute of Technology	Private	2,222	961	0.432	772	180	208	16	-	-	-	0.347	2,906	2,134	993	55	488	0.423	2,764

Class B																			
Montclair State College	Public	3,929	413	0.105	147	102	18	-	-	-	-	0.037	2,917	91	-	-	91	0.030	619
Newark College of Engineering	Public	4,095	738	0.180	710	447	105	-	-	-	-	0.173	3,827	173	-	7	124	0.043	244
Trenton State College	Public	5,582	271	0.049	56	33	9	-	-	-	-	0.010	3,650	11	-	-	11	0.003	196
Class C																			
Drew University	Denom.	1,071	110	0.103	80	80	-	-	-	-	-	0.075	1,798	64	-	10	54	0.034	800
Georgian Court College	Denom.	473	-	0	13	13	-	-	-	-	-	0.027	314	6	-	-	6	0.019	462
Glassboro State College	Public	3,802	152	0.040	18	18	-	-	-	-	-	0.005	1,838	26	-	-	26	0.014	1,444
Jersey City State College	Public	2,770	141	0.051	70	70		-	-	-	-	0.025	1,881	6	-	-	6	0.003	86
Rider College	Private	4,259	34	0.008	8	8	-	-	-	-	-	0.002	2,703	17	-	-	17	0.006	2,125
St. Elizabeth, College of	Denom.	914	-	0	38	38	-	-	-	-	-	0.042	722	9	-	-	9	0.012	237
St. Peter's College	Denom.	2,216	-	0	164	164	-	-	-	-	-	0.074	1,672	55	-	-	55	0.032	335
Upsala College	Denom.	1,924	-	0	118	118	-	-	-	-	-	0.061	1,649	17	-	11	6	0.010	144
NEW MEXICO																			
Class A																			
New Mexico Institute of Mining and Technology	Public	338	40	0.118	47	27	6	1	-	-	-	0.139	1,362	565	487	-	78	0.293	12,021
New Mexico State University	Public	4,930	580	0.118	540	285	82	11	-	-	-	0.110	7,589	1,297	442	37	353	0.146	2,402
New Mexico, The University of	Public	8,642	1,400	0.162	612	240	118	17	-	-	-	0.071	6,775	1,602	529	181	678	0.191	2,618
Class B																			
Eastern New Mexico University	Public	3,227	201	0.062	64	51	5	-	-	-	-	0.020	2,560	84	-	-	84	0.032	1,313
New Mexico Highlands University	Public	1,176	179	0.152	72	32	16	-	-	-	-	0.061	1,393	796	-	242	533	0.364	11,056
Class C																			
Western New Mexico University	Public	989	48	0.049	8	8	-	-	-	-	-	0.008	1,175	9	-	-	9	0.008	1,125
NEW YORK																			
Class A																			
Adelphi University	Private	6,808	1,234	0.181	535	269	99	4	-	-	-	0.079	5,792	738	15	404	310	0.113	1,379
Alfred University	Private	1,499	209	0.139	157	121	5	5	-	-	-	0.105	2,397	167	18	10	107	0.065	1,064
Columbia University	Private	24,000	8,503	0.354	3,650	698	569	202	-		33,122	0.152	45,563	42,530	15,518	15,872	5,622	0.483	11,652
Cornell University	Private	12,687	2,645	0.208	2,789	942	277	155	54	-	82	0.220	70,761	20,440	5,133	8,606	4,045	0.224	7,329

(New York continued next page)

Table A-1.—Continued

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NEW YORK (Cont'd)	Control	Enrollment Total	Enrollment Graduate	R_e	S&T DP	Degrees BA	Degrees MA	Degrees PhD	Degrees DVM	Degrees DDS	Degrees MD	R_d	Dollars in Thousands EGI	Dollars in Thousands FFAS	Dollars in Thousands DOD	Dollars in Thousands USPHS	Dollars in Thousands NSF	R_{fe}	R_{fs}
Fordham University	Denom.	8,951	1,639	0.183	783	292	128	38	-	-	-	0.087	8,430	936	77	334	344	0.100	1,195
New School for Social Research	Private	1,403	740	0.527	249	18	65	15	-	-	-	0.177	1,476	109	-	38	9	0.069	438
New York University	Private	33,232	12,040	0.362	4,450	828	722	145	-	164	127	0.134	57,257	19,857	4,396	12,002	1,457	0.258	4,462
Polytechnic Institute of Brooklyn	Private	5,449	2,690	0.494	1,204	421	221	51	-	-	-	0.221	5,171	4,238	2,453	332	762	0.450	3,520
Rensselaer Polytechnic Institute	Private	4,532	1,426	0.315	1,356	564	241	42	-	-	-	0.299	7,177	3,643	690	231	806	0.337	2,687
Rochester, University of	Private	7,126	1,369	0.192	1,054	294	100	59	-	-	61	0.148	25,513	13,092	773	5,678	5,004	0.339	12,421
Rockefeller Institute	Private	89	89	0	72	-	-	16	-	-	-	0.809	7,129	3,293	-	2,934	337	0.316	45,736
St. Bonaventure University	Denom.	2,105	247	0.117	83	59	8	1	-	-	-	0.039	1,648	22	-	-	12	0.013	265
St. John's University	Denom.	11,594	1,984	0.171	439	224	66	11	-	-	-	0.038	10,904	416	-	316	100	0.037	948
State University of New York - Buffalo	Public	15,714	2,065	0.131	1,162	376	76	23	-	59	64	0.074	11,432	4,022	191	3,034	673	0.260	3,461
State University of New York - Downstate Medical Center	Public	662	32	0.048	534	-	-	4	-	-	129	0.807	5,548	1,634	10	1,544	12	0.228	3,060
State University of New York - Upstate Medical Center	Public	441	42	0.095	328	-	1	3	-	-	78	0.744	5,206	798	23	745	15	0.133	2,433
Syracuse University	Private	19,878	2,741	0.138	1,196	509	192	46	-	-	-	0.060	20,571	7,073	3,417	931	1,932	0.256	5,914
Union College and University	Private	2,846	322	0.113	582	199	50	4	-	-	60	0.204	2,573	1,904	71	1,592	219	0.425	3,271
Yeshiva University	Denom.	3,275	699	0.213	573	119	31	8	-	-	85	0.175	7,035	9,714	468	8,157	991	0.580	16,953
Class B																			
Canisius College	Denom.	2,730	528	0.193	199	111	35	-	-	-	-	0.073	1,957	50	-	-	50	0.025	251
The City University of New York - Brooklyn College	Public	20,314	1,976	0.097	1,090	995	38	-	-	-	-	0.054	13,317	420	-	172	226	0.031	385
The City University of New York - The City College	Public	30,307	3,493	0.115	1,919	1,416	201	-	-	-	-	0.063	17,357	576	11	69	365	0.032	300
The City University of New York - Hunter College	Public	20,531	2,255	0.110	867	777	36	-	-	-	-	0.042	15,599	357	-	229	91	0.022	412
The City University of New York - Queens College	Public	13,642	1,042	0.076	439	394	18	-	-	-	-	0.032	7,763	312	-	107	183	0.039	711
Clarkson College of Technology	Private	1,639	58	0.035	278	185	37	-	-	-	-	0.170	2,280	423	25	76	254	0.156	1,522
Colgate University	Private	1,507	30	0.020	216	181	14	-	-	-	-	0.143	2,741	169	-	4	165	0.058	782
Hofstra University	Private	9,351	2,154	0.230	305	235	28	-	-	-	-	0.033	7,768	36	-	13	23	0.005	118
Long Island University	Private	10,438	866	0.083	349	246	41	-	-	-	-	0.033	9,673	31	-	25	6	0.003	89
Manhattan College	Denom.	3,595	109	0.030	[illegible]	421	7	-	-	-	-	0.122	3,424	414	-	164	250	0.108	943

Niagara University	Denom.	1,850	155	0.084	71	61	4	-	-	-	-	0.038	1,764	51	-	36	15	0.028	718
Pratt Institute	Private	3,590	162	0.045	123	95	11	-	-	-	-	0.034	4,700	40	-	-	40	0.008	325
St. Rose, College of	Denom.	1,379	240	0.174	57	52	2	-	-	-	-	0.041	1,122	5	-	5	-	0.004	88
State University College - Buffalo	Public	4,491	660	0.147	95	45	20	-	-	-	-	0.021	4,269	51	-	-	25	0.012	537
State University of New York at Albany	Public	3,791	396	0.104	275	125	60	-	-	-	-	0.073	4,126	458	172	104	182	0.100	1,665
Vassar College	Private	1,542	12	0.008	118	113	2	-	-	-	-	0.077	3,521	191	-	38	51	0.051	1,619
Wagner College	Denom.	2,146	211	0.098	83	68	6	-	-	-	-	0.039	2,142	47	-	44	3	0.021	566
Webb Institute of Naval Architecture	Private	77	12	0.156	25	15	4	-	-	-	-	0.325	331	50	44	-	6	0.131	2,000
Class C																			
The Cooper Union	Private	1,264	-	0	102	102	-	-	-	-	-	0.081	2,188	8	-	-	-	0.004	78
D'Youville College	Denom.	840	-	0	29	29	-	-	-	-	-	0.035	818	49	-	49	-	0.057	1,690
Elmira College	Private	1,654	220	0.133	66	66	-	-	-	-	-	0.040	1,426	30	-	30	-	0.021	455
Good Counsel College	Denom.	491	-	0	16	16	-	-	-	-	-	0.03[illegible]	451	1	-	-	1	0.002	63
Hartwick College	Denom.	1,015	-	0	58	58	-	-	-	-	-	0.057	1,107	15	-	-	15	0.013	259
Hobart and William Smith Colleges	Private	1,370	2	0.001	128	128	-	-	-	-	-	0.093	1,817	9	-	4	5	0.005	70
Iona College	Denom.	2,384	-	0	106	106	-	-	-	-	-	0.044	1,917	13	-	-	13	0.007	123
Keuka College	Denom.	543	-	0	19	19	-	-	-	-	-	0.035	699	9	-	-	9	0.013	474
Le Moyne College	Denom.	1,358	-	0	112	112	-	-	-	-	-	0.082	1,369	14	-	-	14	0.010	125
Mount St. Vincent, College of	Denom.	867	-	0	59	59	-	-	-	-	-	0.068	968	3	-	-	3	0.003	51
New Rochelle, College of	Denom.	903	-	0	71	71	-	-	-	-	-	0.079	1,042	3	-	-	3	0.003	42
Notre Dame College of Staten Island	Denom.	375	-	0	42	42	-	-	-	-	-	0.112	483	5	-	-	5	0.010	119
Pace College	Private	5,097	127	0.025	4	4	-	-	-	-	-	0.001	3,108	14	-	5	9	0.004	3,500
Rochester Institute of Technology	Private	7,178	17	0.002	121	121	-	-	-	-	-	0.017	4,585	12	-	-	12	0.003	99
Rosary Hill College	Denom.	864	-	0	50	50	-	-	-	-	-	0.058	850	9	-	-	9	0.010	180
Russell Sage College	Private	3,257	47	0.014	48	48	-	-	-	-	-	0.015	1,885	37	-	32	5	0.019	771

(New York continued next page)

Table A–1.—*Continued*

A-1.11

	Control	Enrollment		R_e	S&T DP	Degrees						R_g	Dollars in Thousands					R_{fe}	R_{fd}
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
NEW YORK (Cont'd)																			
St. Francis College	Denom.	1,861	-	0	54	54	-	-	-	-	-	0.029	1,701	6	-	-	6	0.004	111
St. John Fisher College	Denom.	634	-	0	40	40	-	-	-	-	-	0.063	879	2	-	-	-	0.002	50
St. Joseph's College for Women	Denom.	683	-	0	31	31	-	-	-	-	-	0.045	349	7	-	-	7	0.020	226
St. Lawrence University	Private	1,590	113	0.071	205	205	-	-	-	-	-	0.129	2,802	9	-	-	9	0.003	44
Skidmore College	Private	1,278	-	0	71	71	-	-	-	-	-	0.056	2,023	40	-	40	-	0.019	563
State University of New York - Stony Brook	Public	782	29	0.037	73	73	-	-	-	-	-	0.093	4,090	335	19	-	306	0.076	4,589
Wells College	Private	358	1	0.003	49	49	-	-	-	-	-	0.137	1,087	23	-	-	23	0.021	469
Class D																			
Bank Street College of Education	Private	482	15	0.031	-	-	-	-	-	-	-	0.000	480	63	10	15	-	0.116	-
Sarah Lawrence College	Private	583	15	0.026	-	-	-	-	-	-	-	0.000	1,351	43	-	14	29	0.031	-
NORTH CAROLINA																			
Class A																			
Duke University	Private	6,345	1,003	0.158	1,225	378	76	74	-	-	81	0.193	16,586	11,737	1,977	7,215	1 579	0.414	9,581
North Carolina State of the Univ. of North Carolina at Raleigh	Public	12,529	1,169	0.093	1,539	858	175	54	-	-	-	0.123	25,584	2,906	447	726	1,104	0.102	1,888
North Carolina, University of at Chapel Hill	Public	10,517	1,914	0.182	1,407	421	109	66	-	45	59	0.134	23,383	10,498	481	6,695	1,206	0.310	7,461
Wake Forest College	Denom.	2,915	66	0.023	335	119	-	-	-	-	54	0.115	5,503	1,971	-	1,840	78	0.264	5,884
Class B																			
Appalachian State Teachers College	Public	3,447	315	0.091	87	62	10	-	-	-	-	0.025	2,416	88	-	-	88	0.035	1,011
East Carolina College	Public	7,075	369	0.052	166	101	26	-	-	-	-	0.023	4,182	51	-	-	51	0.012	307
North Carolina College at Durham	Public	2,483	301	0.121	146	118	11	-	-	-	-	0.059	2,044	87	-	10	77	0.041	596
Class C																			
The Agricultural and Technical College of North Carolina	Public	2,940	309	0.105	88	88	-	-	-	-	-	0.030	2,417	359	-	13	330	0.129	4,080
Bennett College	Denom.	578	-	0	32	32	-	-	-	-	-	0.055	734	25	-	-	25	0.033	781
Catawba College	Denom	926	-	0	33	33	-	-	-	-	-	0.036	804	7	-	-	7	0.009	212
Davidson College	Denom.	1,009	-	0	138	138	-	-	-	-	-	0.137	1,581	25	-	-	25	0.016	181
Elizabeth City State College	Public	804	-	0	19	19	-	-	-	-	-	0.0[illegible]	691	6	-	-	6	0.009	316
Pfeiffer College	Denom.	873	-	0	35	35	-	-	-	-	-	0.040	808	11	-	-	11	0.013	314

Queens College	Denom.	845	-	0	40	40	-	-	-	-	-	0.047	914	8	-	-	8	0.009	200
St. Augustine's College	Denom.	732	-	0	14	14	-	-	-	-	-	0.019	581	60	-	-	60	0.094	4,286
Western Carolina College	Public	2,479	296	0.119	38	38	-	-	-	-	-	0.015	1,630	4	-	-	4	0.002	105
NORTH DAKOTA																			
Class A																			
North Dakota State University of Agriculture and Applied Science	Public	3,810	270	0.071	475	323	57	2	-	-	-	0.125	7,080	1,047	-	86	324	0.129	2,204
North Dakota, University of	Public	5,477	444	0.081	350	175	68	1	-	-	-	0.064	6,900	1,027	10	389	547	0.130	2,934
Class C																			
Minot State College	Public	2,026	-	0	29	29	-	-	-	-	-	0.014	938	6	-	-	6	0.006	207
OHIO																			
Class A																			
Akron, The University of	Public	7,075	695	0.098	227	123	31	6	-	-	-	0.032	4,593	136	32	14	90	0.029	599
Case Institute of Technology	Private	2,482	883	0.356	698	247	101	44	-	-	-	0.281	5,530	3,914	552	255	1,436	0.414	5,607
Cincinnati, University of	Public	20,261	1,187	0.059	1,246	518	105	34	-	-	78	0.061	14,972	4,713	1,116	3,084	284	0.239	3,783
The Ohio State University	Public	30,500	4,316	0.142	4,055	1,032	350	200	69	140	134	0.133	49,060	13,883	4,364	4,580	2,859	0.221	3,424
Ohio University	Public	13,422	583	0.043	548	420	49	1	-	-	-	0.041	10,407	344	76	19	198	0.032	628
Western Reserve University	Private	8,056	2,606	0.323	1,041	197	60	35	-	54	80	0.129	13,046	9,980	540	7,958	675	0.433	9,587
Class B																			
Bowling Green State University	Public	8,401	455	0.054	365	212	61	-	-	-	-	0.043	7,942	396	-	-	396	0.047	1,085
Dayton, University of	Denom.	7,343	164	0.022	318	313	2	-	-	-	-	0.043	4,359	2,304	2,253	-	51	0.346	7,245
John Carroll University	Denom.	3,933	615	0.156	223	163	24	-	-	-	-	0.057	2,841	11	-	-	11	0.004	49
Kent State University	Public	14,455	1,007	0.070	355	205	60	-	-	-	-	0.025	11,208	298	21	68	183	0.026	839
Miami University	Public	11,700	890	0.076	472	329	57	-	-	-	-	0.040	7,865	267	27	34	185	0.033	566
Oberlin College	Private	2,430	79	0.033	193	183	4	-	-	-	-	0.079	6,065	222	-	32	190	0.035	1,150
Toledo, The University of	Public	7,384	791	0.107	268	180	35	-	-	-	-	0.036	5,682	201	28	12	109	0.034	750
Xavier University	Denom.	4,161	1,408	0.338	165	135	12	-	-	-	-	0.040	2,326	37	-	9	28	0.016	224
Class C																			
Antioch College	Private	1,597	-	0	100	100	-	-	-	-	-	0.063	2,798	366	195	18	153	0.116	3,660
Ashland College	Denom.	1,281	-	0	34	34	-	-	-	-	-	0.027	1,019	7	-	-	7	0.007	206

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Table A–1.—*Continued*

A-1.12

	Control	Enrollment		R_e	S&T DP	Degrees						R_s	Dollars in Thousands					R_{fe}	R_{fd}
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
OHIO (Cont'd)																			
Baldwin-Wallace College	Denom.	2,501	-	0	70	70	-	-	-	-	-	0.028	2,543	57	-	-	57	0.022	814
Capital University	Denom.	1,443	-	0	77	77	-	-	-	-	-	0.053	1,691	43	-	-	43	0.025	558
Central State College	Public	2,105	-	0	56	56	-	-	-	-	-	0.027	2,366	21	-	-	21	0.009	375
Denison University	Private	1,607	-	0	169	169	-	-	-	-	-	0.105	2,622	135	-	48	87	0.049	799
Fenn College	Private	5,868	-	0	159	159	-	-	-	-	-	0.027	2,430	25	-	-	25	0.010	157
Findlay College	Denom.	980	-	0	16	16	-	-	-	-	-	0.016	734	2	-	-	2	0.003	125
Heidelberg College	Denom.	997	-	0	65	65	-	-	-	-	-	0.065	1,217	8	-	-	8	0.007	123
Hiram College	Private	835	-	0	70	70	-	-	-	-	-	0.084	1,328	27	-	13	14	0.020	386
Kenyon College	Private	601	-	0	85	85	-	-	-	-	-	0.141	1,183	35	-	4	31	0.029	412
Marietta College	Private	1,670	-	0	101	101	-	-	-	-	-	0.060	1,428	11	-	-	11	0.008	109
Mount St. Joseph on the Ohio, College of	Denom.	982	-	0	20	20	-	-	-	-	-	0.020	955	16	-	16	-	0.016	800
Mount Union College	Denom.	1,028	-	0	72	72	-	-	-	-	-	0.070	1,318	23	-	9	14	0.017	319
Muskingum College	Denom.	1,362	-	0	113	113	-	-	-	-	-	0.083	1,000*	23	-	-	23	[illegible]	204
Notre Dame College	Denom.	562	-	0	35	35	-	-	-	-	-	0.062	283	3	-	-	3	0.010	86
Ohio Northern University	Denom.	2,332	-	0	111	111	-	-	-	-	-	0.048	1,932	25	-	-	25	0.013	225
Ohio Wesleyan University	Denom.	2,187	-	0	[illegible]	[illegible]	-	-	-	-	-	0.109	2,970	429	-	98	331	0.126	1,795
Our Lady of Cincinnati College	Denom.	1,022	-	0	19	19	-	-	-	-	-	0.019	885	9	-	-	9	0.010	474
St. Mary of the Springs, College of	Denom.	483	-	0	32	32	-	-	-	-	-	0.066	297	4	-	-	4	0.013	125
Steubenville, The College of	Denom.	808	-	0	8	8	-	-	-	-	-	0.010	599	2	-	2	-	0.003	250
Wilmington College	Denom.	786	-	0	38	38	-	-	-	-	-	0.048	843	5	-	-	5	0.006	132
Wittenberg University	Denom.	3,006	165	0.055	79	79	-	-	-	-	-	0.026	3,123	13	-	2	11	0.004	165
Wooster, The College of	Denom.	1,415	-	0	115	115	-	-	-	-	-	0.081	2,438	66	-	7	59	0.026	574
The Youngstown University	Private	8,398	-	0	215	215	-	-	-	-	-	0.026	3,522	12	-	-	12	0.003	56
Class D																			
St. John College of Cleveland	Denom.	1,115	-	0	-	-	-	-	-	-	-	0.000	975	14	-	14	-	0.014	-

OKLAHOMA																			
Class A																			
Oklahoma State University of Agriculture and Applied Science	Public	12,179	1,376	0.113	1,851	813	284	53	41	-	-	0.152	19,769	3,377	563	701	984	0.146	1,824
Oklahoma, University of	Public	13,928	1,902	0.137	1,591	491	[illegible]	50	-	-	90	0.114	9,744	6,681	796	3,787	1,646	0.407	4,199
Class B																			
Southwestern State College	Public	2,090	190	0.064	83	63	8	-	-	-	-	0.028	1,249	126	-	-	126	0.092	1,518
Tulsa, The University of	Private	4,982	593	0.119	246	161	34	-	-	-	-	0.049	2,901	14	-	-	14	0.005	57
Class C																			
Northwestern State College	Public	1,312	90	0.069	38	38	-	-	-	-	-	0.029	760	59	-	-	59	0.072	1,553
Oklahoma Baptist University	Denom.	1,437	-	0	33	33	-	-	-	-	-	0.023	1,072	52	-	-	52	0.046	1,576
Oklahoma City University	Denom.	2,331	-	0	79	79	-	-	-	-	-	0.034	1,753	315	-	119	55	0.152	3,987
Southeastern State College	Public	1,989	328	0.165	50	50	-	-	-	-	-	0.025	1,091	120	-	-	120	0.099	2,400
OREGON																			
Class A																			
Oregon State University	Public	10,026	1,060	0.106	1,359	618	192	58	-	-	-	0.136	19,468	5,481	713	1,418	1,933	0.220	4,033
Oregon, University of	Public	10,609	1,436	0.135	1,276	331	111	30	-	65	68	0.120	12,627	7,722	215	5,974	1,041	0.379	6,052
Portland, University of	Denom.	1,756	249	0.142	133	82	6	8	-	-	-	0.076	1,391	49	-	38	11	0.034	368
Class B																			
Linfield College	Denom.	1,013	21	0.021	43	38	2	-	-	-	-	0.042	995	18	-	5	13	0.018	419
Pacific University	Private	964	20	0.021	58	53	2	-	-	-	-	0.060	917	3	-	3	-	0.003	52
Southern Oregon College	Public	1,843	52	0.028	32	22	4	-	-	-	-	0.017	1,750	10	-	-	10	0.006	313
Class C																			
Marylhurst College	Denom.	608	-	0	18	18	-	-	-	-	-	0.030	340	10	-	-	10	0.029	556
Portland State College	Public	5,787	22	0.004	196	196	-	-	-	-	-	0.034	3,645	135	-	48	87	0.036	689
Reed College	Private	884	43	0.049	82	82	-	-	-	-	-	0.093	1,758	540	9	99	432	0.235	6,585
Willamette University	Denom.	1,318	14	0.011	98	98	-	-	-	-	-	0.074	1,428	43	-	-	43	0.029	439
PENNSYLVANIA																			
Class A																			
Bryn Mawr College	Private	1,032	279	0.270	146	73	13	9	-	-	-	0.141	2,762	692	33	330	[illegible]	0.200	4,740
Carnegie Institute of Technology	Private	4,984	884	0.177	1,005	341	138	71	-	-	-	0.202	7,381	4,933	1,773	375	787	0.401	4,908

(Pennsylvania continued next page)

Table A–1.—*Continued*

	Control	Enrollment		R_e	S&T DP	Degrees						R_s	Dollars in Thousands					A-1.13	
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF	R_{fe}	R_{fd}
PENNSYLVANIA (Cont'd)																			
Duquesne University	Denom.	6,265	930	0.148	170	139	7	3	-	-	-	0.027	3,790	287	-	165	105	0.070	1,688
Hahnemann Medical College	Private	477	86	0.180	373	-	8	2	-	-	86	0.782	1,962	2,008	-	1,967	41	0.506	5,383
Jefferson Medical College	Private	791	148	0.187	641	-	5	8	-	-	148	0.810	3,504	2,243	-	2,243	-	0.390	3,499
Lehigh University	Private	3,800	1,148	0.302	723	364	102	23	-	-	-	0.190	6,551	1,268	212	33	753	0.162	1,754
The Pennsylvania State University	Public	19,706	2,301	0.117	2,758	1,441	289	132	-	-	-	0.140	44,701	7,260	1,165	961	2,753	0.140	2,632
Pennsylvania, University of	Private	18,347	5,448	0.297	2,711	508	294	95	44	106	130	0.148	65,361	20,709	4,527	11,718	3,429	0.241	7,639
Philadelphia College of Pharmacy and Science	Private	648	32	0.049	192	163	8	2	-	-	-	0.296	786	63	-	24	39	0.074	328
Pittsburgh, University of	Private	13,938	3,729	0.268	1,942	583	127	75	-	90	86	0.139	26,092	13,825	1,235	9,361	1,554	0.346	7,119
Temple University	Private	20,698	5,069	0.245	1,556	259	90	16	-	126	124	0.075	18,112	3,389	171	2,629	390	0.158	2,178
Class B																			
Allegheny College	Private	1,370	-	0	140	137	1	-	-	-	-	0.102	1,736	34	-	-	34	0.019	243
Bucknell University	Private	2,671	179	0.067	383	263	48	-	-	-	-	0.143	3,654	228	48	35	145	0.059	595
Drexel Institute of Technology	Private	8,069	1,494	0.185	1,046	583	185	-	-	-	-	0.130	7,308	540	35	309	121	0.069	516
Edinboro State College	Public	2,231	74	0.033	71	63	3	-	-	-	-	0.032	2,054	28	-	-	28	0.013	394
Franklin and Marshall College	Private	1,912	69	0.036	174	171	1	-	-	-	-	0.091	2,521	294	-	33	261	0.104	1,690
Indiana State College	Public	4,613	518	0.112	199	161	15	-	-	-	-	0.043	3,112	78	-	-	78	0.024	392
Marywood College	Denom.	1,438	79	0.055	27	24	1	-	-	-	-	0.019	1,221	9	-	9	-	0.007	333
St. Joseph's College	Denom.	4,678	185	0.040	179	159	8	-	-	-	-	0.038	2,810	10	-	10	-	0.004	56
Villanova University	Denom.	7,089	933	0.132	506	298	83	-	-	-	-	0.071	5,768	222	-	91	131	0.037	439
West Chester State College	Public	3,641	279	0.077	66	48	7	-	-	-	-	0.018	2,683	15	-	-	15	0.006	227
Class C																			
Albright College	Denom.	1,154	-	0	79	79	-	-	-	-	-	0.068	1,329	13	-	-	13	0.010	165
Beaver College	Denom.	707	-	0	33	33	-	-	-	-	-	0.047	947	30	2	28	-	0.031	909
California State College	Public	3,165	-	0	144	144	-	-	-	-	-	0.045	2,749	14	-	-	14	0.005	97
Chatham College	Private	557	-	0	42	42	-	-	-	-	-	0.775	1,026	12	-	4	8	0.012	286

Dickinson College	Private	1,217	-	0	155	155	-	-	-	-	-	0.127	1,808	11	-	6	5	0.006	71
Eastern Baptist College	Denom.	410	-	0	26	26	-	-	-	-	-	0.063	448	3	-	-	3	0.007	115
Geneva College	Denom.	1,707	-	0	68	68	-	-	-	-	-	0.040	1,244	9	-	-	9	0.007	132
Gettysburg College	Denom.	1,852	-	0	211	211	-	-	-	-	-	0.114	2,383	24	-	6	18	0.010	114
Haverford College	Private	463	-	0	56	56	-	-	-	-	-	0.121	1,720	196	-	99	59	0.102	3,500
Juniata College	Denom.	816	-	0	74	74	-	-	-	-	-	0.091	997	134	-	37	86	0.118	1,811
King's College	Denom.	1,184	-	0	103	103	-	-	-	-	-	0.087	1,151	16	-	6	10	0.014	155
Lafayette College	Denom.	1,859	-	0	305	305	-	-	-	-	-	0.164	3,212	120	-	17	130	0.036	393
La Salle College	Denom.	5,080	28	0.006	182	182	-	-	-	-	-	0.036	3,417	18	-	-	18	0.005	99
Lebanon Valley College	Denom.	1,254	-	0	55	55	-	-	-	-	-	0.044	1,093	14	-	-	14	0.013	255
Lincoln University	Private	434	-	0	45	45	-	-	-	-	-	0.104	806	6	-	-	6	0.007	133
Lock Haven State College	Public	1,371	-	0	46	46	-	-	-	-	-	0.034	1,487	8	-	-	8	0.005	174
Mercyhurst College	Denom.	530	-	0	15	15	-	-	-	-	-	0.028	368	12	-	-	12	0.032	800
Millersville State College	Public	2,239	183	0.082	66	66	-	-	-	-	-	0.029	2,481	46	-	-	46	0.018	697
Mount Mercy College	Denom.	1,462	-	0	54	54	-	-	-	-	-	0.037	1,084	40	-	25	15	0.036	741
Muhlenberg College	Denom.	1,618	-	0	158	158	-	-	-	-	-	0.098	1,824	22	-	-	22	0.012	139
Philadelphia College of Textiles and Science	Private	711	-	0	21	21	-	-	-	-	-	0.030	851	10	-	10	-	0.012	476
St. Vincent College	Denom.	934	-	0	76	76	-	-	-	-	-	0.081	751	4	-	-	4	0.005	53
Scranton, University of	Denom.	2,531	379	0.150	108	108	-	-	-	-	-	0.043	1,812	63	-	4	59	0.034	583
Seton Hill College	Denom.	889	-	0	34	34	-	-	-	-	-	0.038	876	51	-	6	45	0.055	1,500
Swarthmore College	Private	977	2	0.002	121	121	-	-	-	-	-	0.124	2,795	166	-	19	147	0.056	1,372
Thiel College	Denom.	987	-	0	86	86	-	-	-	-	-	0.087	1,264	2	-	-	2	0.002	23
Westminster College	Denom.	1,491	349	0.234	61	61	-	-	-	-	-	0.041	1,373	3	-	3	-	0.002	49
Wilkes College	Private	1,693	22	0.013	67	67	-	-	-	-	-	0.040	1,385	69	37	-	32	0.047	1,030
Wilson College	Private	568	-	0	46	46	-	-	-	-	-	0.081	1,017	10	-	-	10	0.010	217

Table A-1.—Continued

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	Control	Enrollment		R_e	S&T DP	Degrees						R_g	Dollars in Thousands					R_{fe}	R_{fd}
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
RHODE ISLAND																			
Class A																			
Brown University	Private	4,281	788	0.184	707	328	58	52	-	-	-	0.165	11,948	6,851	2,951	1,558	1,572	0.364	9,690
Rhode Island, University of	Public	7,378	613	0.083	436	279	43	11	-	-	-	0.059	8,407	1,809	786	287	218	0.177	4,149
Class B																			
Rhode Island College	Public	2,993	348	0.116	32	22	4	-	-	-	-	0.011	2,284	42	-	-	42	0.018	1,313
Class C																			
Providence College	Denom.	2,743	12	0.004	219	219	-	-	-	-	-	0.080	2,253	264	11	249	4	0.105	1,205
Salve Regina College	Denom.	642	-	0	23	23	-	-	-	-	-	0.036	484	13	-	13	-	0.026	565
SOUTH CAROLINA																			
Class A																			
The Clemson Agricultural College	Public	4,252	181	0.043	428	315	56	6	-	-	-	0.101	5,226	1,355	60	172	77	0.206	3,166
South Carolina, Medical College of	Public	377	70	0.186	292	-	1	2	-	-	70	0.775	1,477	1,053	-	985	68	0.416	3,606
South Carolina, University of	Public	8,399	388	0.046	348	211	53	1	-	-	-	0.041	6,800	626	-	61	430	0.084	1,799
Class C																			
Charleston, College of	Private	454	-	0	21	21	-	-	-	-	-	0.046	488	8	-	-	8	0.016	381
Claflin College	Denom.	474	-	0	23	23	-	-	-	-	-	0.049	231	67	-	-	48	0.225	2,913
Columbia College	Denom.	849	-	0	16	16	-	-	-	-	-	0.019	702	64	-	-	64	0.084	4,000
Erskine College	Denom.	719	-	0	31	31	-	-	-	-	-	0.043	691	5	-	-	5	0.007	161
Furman University	Denom.	1,491	77	0.052	103	103	-	-	-	-	-	0.069	1,845	57	-	-	57	0.030	553
South Carolina State College	Public	2,519	1,017	0.404	61	61	-	-	-	-	-	0.024	2,335	110	-	-	110	0.045	1,803
SOUTH DAKOTA																			
Class A																			
South Dakota State College of Agriculture and Mechanic Arts	Public	3,455	217	0.063	453	327	36	8	-	-	-	0.131	7,494	740	-	111	127	0.090	1,634
Class B																			
South Dakota School of Mines and Technology	Public	1,088	38	0.035	188	135	21	-	-	-	-	0.173	1,229	30	14	-	16	0.024	160
South Dakota, University of	Public	2,888	231	0.080	336	156	72	-	-	-	-	0.116	3,205	1,109	11	405	657	0.257	3,301
Class C																			
Augustana College	Denom.	1,659	-	0	84	84	-	-	-	-	-	0.051	1,320	56	-	-	56	0.041	667

TENNESSEE

Class A																			
George Peabody College for Teachers	Private	1,857	577	0.311	250	49	66	8	-	-	-	0.135	2,516	841	-	597	222	0.251	3,364
Tennessee, University of	Public	17,394	1,727	0.099	2,529	617	210	54	-	118	168	0.145	30,872	6,258	365	3,627	619	0.169	2,474
Vanderbilt University	Private	4,202	606	0.144	803	300	73	33	-	-	43	0.191	11,502	6,345	426	4,731	560	0.356	7,902
Class B																			
East Tennessee State College	Public	5,489	235	0.043	173	128	18	-	-	-	-	0.032	3,128	46	-	3	43	0.014	266
Fisk University	Private	955	50	0.052	100	82	7	-	-	-	-	0.105	1,155	267	-	52	198	0.188	2,670
Memphis State University	Public	7,806	552	0.071	181	141	16	-	-	-	-	0.023	3,537	90	-	-	90	0.025	497
Middle Tennessee State College	Public	3,847	228	0.059	153	103	20	-	-	-	-	0.040	2,253	108	-	-	108	0.046	706
Tennessee Agricultural and Industrial State University	Public	4,200	153	0.036	164	149	6	-	-	-	-	0.039	3,377	82	-	-	82	0.024	500
Tennessee Polytechnic Institute	Public	3,394	50	0.015	176	161	6	-	-	-	-	0.052	2,224	7	-	-	7	0.003	40
Class C																			
Austin Peay State College	Public	2,118	60	0.028	61	61	-	-	-	-	-	0.029	1,227	16	-	-	16	0.013	262
Belmont College	Denom.	609	-	0	5	5	-	-	-	-	-	0.008	457	3	-	3	-	0.007	600
Carson-Newman College	Denom.	1,337	-	0	83	83	-	-	-	-	-	0.062	1,098	29	-	29	-	0.026	349
Chattanooga, University of	Private	2,465	176	0.071	92	92	-	-	-	-	-	0.037	1,686	143	-	37	106	0.078	1,554
Christian Brothers College	Denom.	773	-	0	86	86	-	-	-	-	-	0.111	565	43	-	-	31	0.071	500
David Lipscomb College	Denom.	1,472	-	0	39	39	-	-	-	-	-	0.026	1,073	19	-	9	10	0.017	487
King College	Denom.	284	-	0	35	35	-	-	-	-	-	0.123	379	27	-	-	27	0.067	771
Knoxville College	Denom.	747	-	0	13	13	-	-	-	-	-	0.017	698	20	-	-	20	0.028	1,538
Le Moyne College	Denom.	575	-	0	21	21	-	-	-	-	-	0.037	398	19	-	-	19	0.046	905
Southern Missionary College	Denom.	760	-	0	14	14	-	-	-	-	-	0.018	614	45	-	8	37	0.068	3,214
South, The University of the	Denom.	704	-	0	77	77	-	-	-	-	-	0.109	1,945	126	-	-	126	0.061	1,636
Southwestern at Memphis	Denom.	878	-	0	68	68	-	-	-	-	-	0.077	1,434	61	-	27	34	0.041	897
Tennessee Wesleyan College	Denom.	767	-	0	12	12	-	-	-	-	-	0.016	616	17	-	-	17	0.027	1,417

Table A–1.—*Continued*

TEXAS	Control	Enrollment		R_e	S&T DP	Degrees						R_s	Dollars in Thousands					R_{fe}	R_{fd}
		Total	Graduate			BA	MA	PhD	DVM	DDS	MD		EGI	FFAS	DOD	USPHS	NSF		
Class A																			
Baylor University	Denom.	6,207	537	0.087	1,088	189	47	10	-	104	80	0.175	4,336	6,755	209	6,207	248	0.609	6,209
Houston, University of	Public	13,665	1,239	0.091	519	311	67	9	-	-	-	0.038	8,119	842	38	172	283	0.094	1,622
Rice (William Marsh) University	Private	2,122	429	0.202	492	236	54	27	-	-	-	0.232	4,810	2,500	261	431	615	0.342	5,081
Southern Methodist University	Denom.	7,114	803	0.113	568	215	139	1	-	-	-	0.080	6,530	529	236	93	184	0.075	931
Texas Agricultural and Mechanical University	Public	17,216	967	0.056	1,400	661	170	45	51	-	-	0.081	8,476	4,721	940	372	1,039	0.358	3,372
Texas Technological College	Public	11,181	554	0.050	772	582	69	4	-	-	-	0.069	7,531	307	-	33	125	0.039	398
Texas, University of	Public	23,747	2,735	0.115	3,419	1,078	216	137	-	81	215	0.144	55,268	17,850	4,040	9,847	2,315	0.244	5,221
Class B																			
Abilene Christian College	Private	2,778	124	0.045	96	88	3	-	-	-	-	0.035	1,950	28	-	8	20	0.014	292
East Texas State College	Public	3,849	494	0.128	215	110	42	-	-	-	-	0.056	2,660	32	-	-	32	0.012	149
North Texas State University	Public	10,657	1,310	0.123	305	225	32	-	-	-	-	0.029	6,139	242	-	73	169	0.038	793
Prairie View Agricultural and Mechanical College	Public	3,418	152	0.044	95	75	8	-	-	-	-	0.028	2,555	114	-	15	99	0.043	1,200
St. Mary's University of San Antonio	Denom.	2,440	230	0.094	178	135	17	-	-	-	-	0.073	1,761	12	-	-	12	0.007	67
Sam Houston State Teachers College	Public	5,396	300	0.056	226	206	8	-	-	-	-	0.042	3,162	13	-	13	-	0.004	58
Southwest Texas State College	Public	3,467	153	0.044	131	86	18	-	-	-	-	0.038	2,254	39	-	39	-	0.017	298
Stephen F. Austin State College	Public	2,740	175	0.064	152	94	23	-	-	-	-	0.055	1,864	47	-	-	47	0.025	309
Sul Ross State College	Public	1,199	73	0.061	71	63	3	-	-	-	-	0.059	1,042	32	-	4	28	0.030	451
Texas Christian University	Denom.	6,631	612	0.092	273	190	33	-	-	-	-	0.041	4,694	378	61	115	155	0.075	1,385
Texas College of Arts and Industries	Public	3,517	297	0.084	227	194	13	-	-	-	-	0.065	2,350	41	-	-	41	0.017	181
Texas Southern University	Public	3,846	295	0.077	65	50	6	-	-	-	-	0.017	2,363	142	-	-	142	0.057	2,185
Texas Woman's University	Public	2,979	305	0.102	77	67	4	-	-	-	-	0.026	2,409	428	-	106	199	0.151	5,558
Trinity University	Denom.	1,757	294	0.167	140	70	28	-	-	-	-	0.080	1,954	42	-	-	42	0.021	300
West Texas State University	Public	3,778	554	0.147	139	101	15	-	-	-	-	0.037	2,019	10	-	10	-	0.005	72
Class C																			
Austin College	Denom.	964	13	0.013	54	54	-	-	-	-	-	0.056	1,353	4	-	4	-	0.003	74
Howard Payne College	Denom.	1,100	70	0.064	24	24	-	-	-	-	-	0.022	1,017	58	-	-	58	0.054	2,417

Huston-Tillotson College	Private	575	-	0	39	39	-	-	-	-	-	0.068	467	52	-	-	52	0.100	1,333
Incarnate Word College	Denom.	1,063	65	0.061	18	18	-	-	-	-	-	0.017	666	50	-	-	50	0.070	2,778
Lamar State College of Technology	Public	5,967	138	0.023	279	279	-	-	-	-	-	0.047	3,326	8	-	-	8	0.002	29
McMurry College	Denom.	1,704	29	0.017	23	23	-	-	-	-	-	0.013	854	15	-	6	3	0.017	652
Midwestern University	Public	2,356	84	0.036	51	51	-	-	-	-	-	0.022	1,887	20	-	-	20	0.010	392
Our Lady of the Lake College	Denom.	954	193	0.202	19	19	-	-	-	-	-	0.020	608	77	-	74	3	0.112	4,053
Pan American College	Public	2,105	-	0	18	18	-	-	-	-	-	0.009	1,231	34	-	-	34	0.027	1,889
Sacred Heart Dominican College	Denom.	493	-	0	4	4	-	-	-	-	-	0.008	297	2	-	-	2	0.007	500
St. Edward's University	Denom.	573	-	0	21	21	-	-	-	-	-	0.037	565	4	-	-	4	0.007	190
St. Thomas, University of	Denom.	631	-	0	32	32	-	-	-	-	-	0.051	707	5	-	-	5	0.007	156
Southwestern University	Denom.	702	-	0	35	35	-	-	-	-	-	0.050	853	7	-	-	7	0.008	200
Texas Lutheran College	Denom.	640	-	0	18	18	-	-	-	-	-	0.028	679	40	-	21	19	0.056	2,222
Texas Western College	Public	5,449	269	0.049	186	186	-	-	-	-	-	0.034	2,730	360	128	-	232	0.117	1,935
Wayland Baptist College	Denom.	597	-	0	13	13	-	-	-	-	-	0.022	634	2	-	-	2	0.003	154
Wiley College	Denom.	526	-	0	11	11	-	-	-	-	-	0.021	441	7	-	-	7	0.016	636
UTAH																			
Class A Brigham Young University	Denom.	13,352	525	0.039	624	493	45	4	-	-	-	0.047	11,815	584	26	144	261	0.047	936
Utah State University	Public	7,819	480	0.061	744	394	97	24	-	-	-	0.095	10,649	2,820	1,377	402	380	0.209	3,790
Utah, University of	Public	13,448	2,156	0.160	1,232	595	99	67	-	-	47	0.099	16,256	8,297	1,806	4,523	1,125	0.338	6,229
VERMONT																			
Class A Vermont, University of	Public	4,076	224	0.055	563	274	32	2	-	-	50	0.138	6,715	3,395	130	2,391	407	0.336	6,030
Class C Bennington College	Private	388	-	0	3	3	-	-	-	-	-	0.008	993	114	-	6	104	0.103	38,000
Goddard College	Private	221	-	0	1	1	-	-	-	-	-	0.005	513	48	-	48	-	0.086	48,000
Middlebury College	Private	1,319	5	0.004	147	147	-	-	-	-	-	0.111	2,270	5	-	5	-	0.002	34

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Table A-1.—Continued

		Enrollment				Degrees							Dollars in Thousands						
	Control	Total	Graduate	R_e	S&T DP	BA	MA	PhD	DVM	DDS	MD	R_s	EGI	FFAS	DOD	USPHS	NSF	R_{fe}	R_{fd}
VIRGINIA																			
Class A																			
Virginia, Medical College of	Public	1,109	81	0.073	921	303	9	6	-	75	67	0.830	5,607	3,098	-	3,033	18	0.356	3,364
Virginia Polytechnic Institute	Public	7,739	616	0.080	1,180	741	136	22	-	-	-	0.152	16,778	2,171	100	407	284	0.115	1,840
Virginia, University of	Public	12,899	1,110	0.086	1,091	404	98	44	-	-	61	0.085	22,426	5,249	918	2,127	1,333	0.190	4,811
Class B																			
Hampton Institute	Private	1,656	74	0.045	70	67	1	-	-	-	-	0.042	2,381	73	-	-	73	0.030	1,043
Hollins College	Private	715	11	0.015	45	37	3	-	-	-	-	0.063	1,527	91	-	19	48	0.056	2,022
Madison College	Public	1,712	80	0.047	34	29	2	-	-	-	-	0.020	1,711	10	-	-	10	0.006	294
Richmond, University of	Denom.	3,555	226	0.064	187	169	7	-	-	-	-	0.053	2,518	12	-	12	-	0.005	64
Virginia State College - Petersburg	Public	3,884	119	0.031	100	92	3	-	-	-	-	0.026	2,998	330	-	6	230	0.099	3,300
William and Mary in Virginia, The College of	Public	5,889	269	0.046	283	225	23	-	-	-	-	0.048	3,368	361	-	98	238	0.097	1,276
Class C																			
Bridgewater College	Denom.	660	-	0	46	46	-	-	-	-	-	0.070	669	18	-	13	5	0.026	391
Eastern Mennonite College	Denom.	554	-	0	22	22	-	-	-	-	-	0.040	478	15	-	6	9	0.030	682
Emory and Henry College	Denom.	785	-	0	47	47	-	-	-	-	-	0.060	892	23	-	-	23	0.025	489
Hampden-Sydney College	Denom.	504	-	0	41	41	-	-	-	-	-	0.081	746	49	-	29	20	0.062	1,195
Longwood College	Public	1,160	19	0.016	25	25	-	-	-	-	-	0.022	1,164	18	-	-	9	0.015	720
Lynchburg College	Denom.	924	-	0	74	74	-	-	-	-	-	0.080	919	26	-	-	26	0.028	351
Old Dominion College	Public	4,942	-	0	64	64	-	-	-	-	-	0.013	2,362	53	10	3	40	0.022	828
Randolph-Macon Woman's College	Den.	732	-	0	50	50	-	-	-	-	-	0.068	1,422	62	-	-	62	0.042	1,240
Sweet Briar College	Private	644	-	0	42	42	-	-	-	-	-	0.065	1,435	2	-	-	2	0.001	48
Virginia Union University	Denom.	1,218	-	0	60	60	-	-	-	-	-	0.049	809	13	-	-	13	0.016	217
Washington and Lee University	Private	1,231	-	0	77	77	-	-	-	-	-	0.063	1,957	60	-	-	60	0.030	779
WASHINGTON																			
Class A																			
Washington State University	Public	8,310	744	0.090	966	476	95	34	45	-	-	0.116	21,599	2,977	158	1,050	620	0.121	3,082
Washington, University of	Public	23,906	3,409	0.143	2,909	1,052	313	116	-	57	81	0.122	38,111	21,363	1,773	10,913	6,735	0.359	7,344

Class B																			
Eastern Washington State College	Public	3,122	63	0.020	77	62	6	-	-	-	-	0.025	2,796	9	-	-	9	0.003	117
Gonzaga University	Denom.	2,245	86	0.038	95	85	4	-	-	-	-	0.042	1,815	9	-	-	9	0.005	95
Puget Sound, University of	Denom.	2,950	51	0.017	88	83	2	-	-	-	-	0.030	1,941	34	-	-	34	0.017	386
Seattle University	Denom.	3,817	218	0.057	210	177	13	-	-	-	-	0.055	[illegible],017	223	50	72	101	0.100	1,062
Walla Walla College	Denom.	1,424	26	0.018	54	49	2	-	-	-	-	0.038	1,282	30	-	20	10	0.023	556
Class C																			
Pacific Lutheran University	Denom.	1,812	52	0.029	66	66	-	-	-	-	-	0.036	1,575	21	-	-	21	0.013	318
St. Martin's College	Denom.	454	-	0	16	16	-	-	-	-	-	0.035	250*	15	-	-	15	0.057	938
Seattle Pacific College	Denom.	1,567	18	0.011	48	48	-	-	-	-	-	0.031	1,216	18	-	-	18	0.015	375
Western Washington State College	Public	4,197	29	0.007	142	142	-	-	-	-	-	0.034	3,500*	139	-	-	133	0.038	979
Whitman College	Private	888	-	0	84	84	-	-	-	-	-	0.095	1,257	37	-	19	18	0.029	440
Whitworth College	Private	1,624	52	0.032	51	51	-	-	-	-	-	0.031	1,039	16	-	-	16	0.015	314
Class D																			
Forth Wright College of The Holy Names	Denom.	448	-	0	-	-	-	-	-	-	-	0.000	500*	13	-	-	13	0.025	-
WEST VIRGINIA																			
Class A																			
West Virginia University	Public	9,565	834	0.087	1,038	432	119	8	-	25	43	0.109	17,978	3,165	46	1,440	562	0.150	3,049
Class B																			
Marshall University	Public	4,790	564	0.118	198	120	31	-	-	-	-	0.041	3,014	114	18	-	96	0.036	576
Class C																			
Bethany College	Private	[illegible]	-	0	56	56	-	-	-	-	-	0.070	1,017	58	-	-	58	0.054	1,036
Fairmont State College	Public	1,467	-	0	36	36	-	-	-	-	-	0.025	921	11	-	-	11	0.012	306
Morris Harvey College	Private	2,377	-	0	67	67	-	-	-	-	-	0.028	1,117	4	-	4	-	0.004	60
West Virginia Institute of Technology	Public	1,058	-	0	72	72	-	-	-	-	-	0.068	923	8	-	-	8	0.009	111
West Virginia Wesleyan College	Denom.	1,320	-	0	82	82	-	-	-	-	-	0.062	1,231	94	-	-	94	0.071	1,146
Wheeling College	Denom.	519	-	0	50	50	-	-	-	-	-	0.096	622	20	-	6	14	0.031	400

Table A-1.—Continued

		Enrollment				Degrees							Dollars in Thousands						
	Control	Total	Graduate	R_e	S&T DP	BA	MA	PhD	DVM	DDS	MD	R_a	EGI	FFAS	DOD	USPHS	NSF	R_{fa}	R_{fd}
WISCONSIN																			
Class A																			
Lawrence University	Private	1,38[illegible]	72	0.052	209	105	18	13	-	-	-	0.151	2,778	57	-	11	46	0.020	273
Marquette University	Denom.	10,078	812	0.081	1,416	464	64	-	-	107	91	0.141	9,680	2,663	-	2,417	193	0.216	1,881
Wisconsin, University of	Public	35,251	5,855	0.166	4,427	1,459	530	302	-	-	71	0.126	50,861	20,340	1,269	10,427	5,028	0.286	4,595
Class C																			
Alverno College	Denom.	1,179	-	0	17	17	-	-	-	-	-	0.014	1,033	12	-	12	-	0.011	706
Beloit College	Private	1,101	1	0.001	114	114	-	-	-	-	-	0.104	1,844	90	-	-	90	0.047	789
Cardinal Stritch College	Denom.	441	137	0.311	8	8	-	-	-		-	0.018	476	2	-	-	2	0.004	250
Edgewood College of The Sacred Heart	Denom.	580	-	0	2	2	-	-	-	-	-	0.003	306	2	-	-	2	0.006	1,000
Northland College	Private	420	-	0	45	45	-	-	-	-	-	0.107	314	5	-	-	5	0.016	111
Ripon College	Private	764	-	0	60	60	-	-	-	-	-	0.079	1,202	93	-	-	93	0.072	1,550
Wisconsin State College and Institute of Technology	Public	2,625	-	0	87	87	-	-	-	-	-	0.033	2,264	7	-	-	7	0.003	80
Wisconsin State College - Eau Claire	Public	2,852	-	0	103	103	-	-	-	-	-	0.036	2,240	2	-	-	2	0.001	19
Wisconsin State College - La Crosse	Public	2,337	-	0	79	79	-	-	-	-	-	0.034	1,814	2	-	2	-	0.001	25
Wisconsin State College - Oshkosh	Public	4,385	-	0	102	102	-	-	-	-	-	0.023	2,255	5	-	-	5	0.002	49
Wisconsin State College - River Falls	Public	2,066	-	0	81	81	-	-	-	-	-	0.039	1,739	42	-	-	42	0.024	519
Wisconsin State College - Stevens Point	Public	2,938	-	0	95	95	-	-	-	-	-	0.032	1,822	23	-	-	23	0.012	242
Wisconsin State College - Superior	Public	1,610	69	0.043	51	51	-	-	-	-	-	0.032	1,326	5	-	-	5	0.004	98
Class D																			
Carthage College	Private	974	-	0	-	-	-	-	-	-	-	0.000	1,226	7	-	-	7	0.006	-
WYOMING																			
Class A																			
Wyoming, University of	Public	5,571	480	0.086	582	280	106	8	-	-	-	0.104	9,116	937	-	58	321	0.093	1,610
PUERTO RICO																			
Class A																			
Puerto Rico, University of	Public	21,454	564	0.026	959	633	20	-	-	22	47	0.045	25,567	3,983	402	1,891	712	0.135	4,153
Class C																			
Catholic University of Puerto Rico	Denom.	2,974	-	0	41	41	-	-	-	-	-	0.014	1,070	84	-	35	49	0.073	2,049
Inter American University of Puerto Rico	Denom.	4,275	-	0	58	58	-	-	-	-	-	0.014	2,430	60	-	-	60	0.024	1,034

Table A–2

SELECTED FUNDING AND MANPOWER CHARACTERISTICS IN SCIENCE AND TECHNOLOGY OF DEGREE-ACCREDITED INSTITUTIONS NOT RECEIVING FEDERAL FUNDS FOR ACADEMIC SCIENCE IN FISCAL YEAR 1963 AND ACADEMIC YEAR 1962-63 ARRANGED ALPHABETICALLY BY STATE AND CLASS

(Educational and General Income in Thousands of Dollars)

	Control	Enrollment		R_e	S&T DP	BA	MA	R_s	EGI
		Total	Graduate						
ALABAMA									
Class B									
Jacksonville State College	Public	2,430	35	0.014	80	75	2	0.033	2,000 *
Class C									
Athens College	Denom.	626	-	0	22	22	-	0.035	311
Florence State College	Public	1,893	19	0.010	75	75	-	0.040	1,241
Howard College	Denom.	2,173	-	0	38	38	-	0.017	1,720
Huntington College	Denom.	836	-	0	42	42	-	0.050	794
Judson College	Denom.	287	-	0	8	8	-	0.028	256
Oakwood College	Denom.	346	-	0	4	4	-	0.012	350
St. Bernard College	Denom.	449	-	0	17	17	-	0.038	396
Spring Hill College	Denom.	1,451	11	0.008	63	63	-	0.043	593
Stillman College	Denom.	529	-	0	11	11	-	0.021	419
Troy State College	Public	2,267	6	0.003	69	69	-	0.030	1,417
ARKANSAS									
Class B									
Henderson State Teachers College	Public	1,873	47	0.025	87	77	4	0.046	1,047
Class C									
Agricultural, Mechanical, and Normal College	Public	2,242	-	0	74	74	-	0.033	1,247
Arkansas Agricultural and Mechanical College	Public	1,109	-	0	45	45	-	0.041	912
Arkansas College	Denom.	278	-	0	9	9	-	0.032	322
Harding College	Denom.	1,359	138	0.102	40	40	-	0.029	1,380

Hendrix College	Denom.	605	-	0	33	33	-	0.055	735
John Brown University	Private	364	-	0	18	18	-	0.049	538
Ouachita Baptist College	Denom.	1,440	18	0.013	54	54	-	0.038	978
Philander Smith College	Denom.	619	-	0	14	14	-	0.023	464
CALIFORNIA									
Class B									
Pepperdine College	Private	1,264	119	0.094	85	30	22	0.067	1,472
Class C									
California Baptist College	Denom.	432	-	0	17	17	-	0.039	415
California Western University	Denom.	2,078	149	0.072	29	29	-	0.014	1,143
La Verne College	Denom.	589	-	0	20	20	-	0.034	602
Los Angeles College of Optometry	Private	117	-	0	3	3	-	0.026	107
Los Angeles Pacific College	Denom.	242	-	0	1	1	-	0.004	353
Marymount College	Denom.	253	-	0	2	2	-	0.008	391
Notre Dame, College of	Denom.	416	-	0	5	5	-	0.012	262
Pasadena College	Denom.	1,135	141	0.124	42	42	-	0.037	977
St. Joseph College of Orange	Denom.	223	-	0	1	1	-	0.004	250 *
San Diego, College for Men, University of	Denom.	324	-	0	6	6	-	0.019	389
San Diego College for Women	Denom.	701	28	0.040	37	37	-	0.053	362
San Francisco College for Women	Denom.	537	14	0.026	26	26	-	0.048	396
Scripps College	Private	318	-	0	11	11	-	0.035	784
Stanislaus State College	Public	774	-	0	6	6	-	0.008	763
Upland College	Denom.	119	-	0	7	7	-	0.059	250
Class D									
San Luis Rey College	Denom.	76	-	0	-	-	-	0	56
Sonoma State College	Public	1,027	-	0	-	-	-	0	829

* Estimated

S&T DP = Science and Technology Degree Productivity
R = Graduate student enrollment/total enrollment
R_s^e = Science and technology degree productivity/total enrollment

Table A-2.—Continued

	Control	Enrollment Total	 Graduate	R_e	S&T DP	BA	MA	R_s	EGI
COLORADO									
Class C Adams State College of Colorado	Public	1,664	185	0.111	73	73	-	0.044	1,501
Class D Colorado Woman's College	Denom.	718	-	0	-	-	-	0	1,019
CONNECTICUT									
Class C Annhurst College	Denom.	244	-	0	6	6	-	0.025	250
Danbury State College	Public	1,535	225	0.147	13	13	-	0.008	777
Southern Connecticut State College	Public	4,232	902	0.213	15	15	-	0.004	2,481
Class D Quinnipiac College	Private	1,518	-	0	-	-	-	0	777
Willimantic State College	Public	930	318	0.342	-	-	-	0	794
DELAWARE									
Class C Delaware State College	Public	563	-	0	26	26	-	0.046	930
DISTRICT OF COLUMBIA									
Class C District of Columbia Teachers College	Public	1,459	-	0	8	8	-	0.005	1,580
Trinity College	Denom.	886	-	0	104	104	-	0.117	977
FLORIDA									
Class C Bethune-Cookman College	Private	720	-	0	19	19	-	0.026	504
Class D Florida Memorial College	Private	341	-	0	-	-	-	0	177
GEORGIA									
Class B The Woman's College of Georgia	Public	920	49	0.053	24	21	1	0.026	1,179
Class C Berry College	Private	756	-	0	24	24	-	0.032	1,299

Brenau College	Private	511	-	0	3	3	-	0.006	406
Clark College	Denom.	770	-	0	15	15	-	0.019	700*
The Fort Valley State College	Public	1,034	45	0.044	17	17	-	0.016	1,179
Mercer University	Denom.	1,458	218	0.150	64	64	-	0.044	1,747
Morris Brown College	Denom.	921	-	0	51	51	-	0.055	643
Oglethorpe University	Private	477	-	0	15	15	-	0.031	223
Paine College	Denom.	430	-	0	14	14	-	0.033	384
Tift College	Denom.	556	-	0	13	13	-	0.023	310
Valdosta State College	Public	1,013	-	0	36	36	-	0.036	584
Wesleyan College	Denom.	571	-	0	11	11	-	0.019	657
HAWAII									
Class C									
Chaminade College of Honolulu	Denom.	352	-	0	2	2	-	0.006	292
The Church College of Hawaii	Denom.	891	-	0	3	3	-	0.003	779
ILLINOIS									
Class C									
Augustana College	Denom.	1,430	-	0	62	62	-	0.043	1,442
Aurora College	Denom.	1,125	-	0	18	18	-	0.016	596
Barat College of the Sacred Heart	Denom.	415	-	0	25	25	-	0.060	436
Blackburn University	Private	397	-	0	48	48	-	0.121	481
Elmhurst College	Denom.	1,693	-	0	56	56	-	0.033	1,052
Eureka College	Denom.	307	-	0	11	11	-	0.036	457
Greenville College	Denom.	718	-	0	50	50	-	0.070	563
Illinois College	Private	526	-	0	54	54	-	0.103	493
Lewis College	Denom.	659	-	0	26	26	-	0.039	423
Monmouth College	Denom.	891	-	0	57	57	-	0.064	1,179
Quincy College	Denom.	1,027	-	0	14	14	-	0.014	1,102
St. Francis, College of	Denom.	598	-	0	38	38	-	0.064	245

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Table A-2.—*Continued*

A-2.3

	Control	Enrollment Total	Enrollment Graduate	R_e	S&T DP	BA	MA	R_s	EGI
ILLINOIS (Cont'd)									
Class C									
Shimer College	Private	280	-	0	4	4	-	0.014	468
Class D									
Concordia Teachers College	Denom.	1,154	21	0.018	-	-	-	0	1,548
National College of Education	Private	794	303	0.382	-	-	-	0	1,039
INDIANA									
Class B									
Saint Francis College	Denom.	855	327	0.382	21	8	5	0.025	370
Class C									
Concordia Senior College	Denom.	423	-	0	64	64	-	0.151	508
Franklin College of Indiana	Denom.	659	-	0	49	49	-	0.074	804
Huntington College	Denom.	433	-	0	10	10	-	0.023	450
Saint Joseph's College	Denom.	2,066	-	0	63	63	-	0.030	1,480
Saint Mary-of-the-Woods College	Denom.	657	-	0	32	32	-	0.049	457
IOWA									
Class C									
Briar Cliff College	Denom.	625	-	0	8	8	-	0.013	443
Buena Vista College	Denom.	874	-	0	16	16	-	0.018	746
Clarke College	Denom.	932	-	0	54	54	-	0.058	852
Graceland College	Denom.	821	-	0	5	5	-	0.006	821
Iowa Wesleyan College	Denom.	852	-	0	29	29	-	0.034	892
Mount Mercy College	Denom.	390	-	0	3	3	-	0.008	129
St. Ambrose College	Denom.	1,444	-	0	72	72	-	0.050	1,150
Upper Iowa University	Private	1,108	-	0	26	26	-	0.023	531
Wartburg College	Denom.	1,126	-	0	31	31	-	0.028	757
Westmar College	Denom.	738	-	0	30	30	-	0.041	655
William Penn College	Denom.	642	-	0	27	27	-	0.042	536

KANSAS									
Class C									
Baker University	Denom.	694	-	0	36	36	-	0.052	690
Bethany College	Denom.	1,068	-	0	24	24	-	0.022	560
Emporia, College of	Denom.	618	-	0	21	21	-	0.034	644
Friends University	Denom.	628	-	0	15	15	-	0.024	510
Marymount College	Denom.	531	-	0	13	13	-	0.024	665
McPherson College	Denom.	602	-	0	25	25	-	0.042	408
Ottawa University	Denom.	663	-	0	27	27	-	0.041	622
Saint Mary College	Denom.	610	-	0	8	8	-	0.013	250 *
Saint Mary of the Plains College	Denom.	507	-	0	6	6	-	0.012	293
Southwestern College	Denom.	696	-	0	25	25	-	0.036	644
Sterling College	Denom.	526	-	0	23	23	-	0.044	446
KENTUCKY									
Class C									
Catherine Spalding College	Denom.	1,385	76	0.055	20	20	-	0.014	498
Georgetown College	Denom.	1,186	60	0.051	59	59	-	0.050	979
Kentucky Wesleyan College	Denom.	675	-	0	23	23	-	0.034	623
Pikeville College	Denom.	766	-	0	24	24	-	0.031	425
Transylvania College	Private	624	-	0	31	31	-	0.050	731
Union College	Denom.	768	17	0.022	22	22	-	0.029	682
Ursuline College	Denom.	529	-	0	16	16	-	0.030	559
MAINE									
Class C									
Saint Joseph's College	Denom.	246	-	0	2	2	-	0.008	66
Class D									
Farmington State Teachers College	Public	534	-	0	-	-	-	0	790
Gorham State Teachers College	Public	793	-	0	-	-	-	0	553

Table A–2.—Continued

A-2.4

	Control	Enrollment Total	Enrollment Graduate	R_e	S&T DP	BA	MA	R_g	EGI
MARYLAND									
Class C									
Frostburg State College	Public	1,546	-	0	32	32	-	0.021	1,059
Mount Saint Agnes College	Denom.	422	-	0	7	7	-	0.017	250*
Mount Saint Mary's College	Denom.	791	-	0	50	50	-	0.063	795
Salisbury State College	Public	552	-	0	1	1	-	0.002	577
Class D									
Bowie State College	Public	365	-	0	-	-	-	0	644
Coppin State College	Public	371	-	0	-	-	-	0	510
St. John's College	Private	313	-	0	-	-	-	0	797
Towson State College	Public	2,018	37	0.018	-	-	-	0	1,717
MASSACHUSETTS									
Class C									
American International College	Private	2,880	213	0.074	59	59	-	0.020	1,496
Bradford Durfee College of Technology	Public	616	-	0	53	53	-	0.086	604
Emerson College	Private	726	33	0.045	2	2	-	0.003	761
New Bedford Institute of Technology	Public	625	-	0	27	27	-	0.043	650
Newton College of the Sacred Heart	Denom.	665	-	0	60	60	-	0.090	1,324
Our Lady of Elms, College of	Denom.	840	-	0	37	37	-	0.044	679
State College at Boston	Public	3,105	57	0.018	33	33	-	0.011	1,429
State College at North Adams	Public	1,049	380	0.362	12	12	-	0.011	107
State College at Worcester	Public	1,649	601	0.364	47	47	-	0.029	677
Class D									
Lesley College	Private	546	72	0.132	-	-	-	0	519
State College at Fitchburg	Public	1,381	225	0.163	-	-	-	0	1,056
State College at Framingham	Public	1,360	-	0	-	-	-	0	647
State College at Lowell	Public	625	-	0	-	-	-	0	476

State College at Westfield	Public	1,187	298	0.251	-	-	-	0	1,000 *
Wheelock College	Private	505	27	0.053	-	-	-	.000	561
MICHIGAN									
Class C Adrian College	Denom.	1,049	-	0	26	26	-	0.025	976
Aquinas College	Denom.	1,163	22	0.019	82	82	-	0.071	604
The Detroit Institute of Technology	Private	2,330	-	0	78	78	-	0.033	1,143
Hillsdale College	Private	829	-	0	50	50	-	0.060	1,032
Madonna College	Denom.	391	-	0	17	17	-	0.043	730
Nazareth College	Denom.	355	-	0	12	12	-	0.034	478
Class D Ferris State College	Public	3,517	-	0	-	-	-	0	3,200
MINNESOTA									
Class B Moorhead State College	Public	2,464	120	0.049	65	57	3	0.026	1,698
Class C Saint Benedict, College of	Denom.	447	-	0	15	15	-	0.034	446
MISSISSIPPI									
Class C Alcorn Agricultural and Mechanical College	Public	1,423	-	0	30	30	-	0.021	1,132
Belhaven College	Denom.	355	-	0	5	5	-	0.014	276
Blue Mountain College	Denom.	270	-	0	3	3	-	0.011	292
Delta State College	Public	1,318	-	0	38	38	-	0.029	976
William Carey College	Denom.	593	-	0	7	7	-	0.012	434
MISSOURI									
Class C Avila College	Denom.	487	-	0	9	9	-	0.018	427
Culver-Stockton College	Denom.	677	-	0	18	18	-	0.027	687
Drury College	Denom.	1,143	64	0.056	55	55	-	0.048	992
Fontbonne College	Denom.	890	-	0	29	29	-	0.033	664

Table A-2.—Continued

	Control	Enrollment		R_e	S&T DP	BA	MA	R_s	EGI
		Total	Graduate						
MISSOURI (Cont'd)									
Lindenwood College	Denom.	626	-	0	15	15	-	0.024	951
Marillac College	Denom.	325	-	0	15	15	-	0.046	300 *
Maryville College of the Sacred Heart	Denom.	278	-	0	14	14	-	0.050	375
Missouri Valley College	Denom.	552	-	0	44	44	-	0.080	627
Northwest Missouri State College	Public	2,654	-	0	49	49	-	0.018	1,825
Park College	Denom.	500	-	0	20	20	-	0.040	974
Westminster College	Denom.	626	-	0	83	83	-	0.133	891
Class D									
Cardinal Glennon College	Denom.	237	-	0	-	-	-	0	100
Harris Teachers College	Public	1,811	-	0	-	-	-	0	369
Stephens College	Private	1,780	-	0	-	-	-	0	4,421
MONTANA									
Class C									
Great Falls, College of	Denom.	911	-	0	17	17	-	0.019	441
Northern Montana College	Public	790	-	0	7	7	-	0.009	750
Rocky Mountain College	Denom.	407	-	0	15	15	-	0.037	428
Western Montana College of Education	Public	616	26	0.042	13	13	-	0.021	452
NEBRASKA									
Class C									
Concordia Teachers College	Denom.	937	-	0	24	24	-	0.026	1,000
Dana College	Denom.	647	-	0	46	46	-	0.071	615
Duchesne College of the Sacred Heart	Denom.	330	-	0	12	12	-	0.036	394
Kearney State College	Public	2,655	82	0.031	61	61	-	0.023	1,747
Midland Lutheran College	Denom.	859	-	0	35	35	-	0.041	633
Peru State College	Public	850	-	0	26	26	-	0.031	848

Saint Mary, College of	Denom.	571	-	0	2	2	-	0.004	458
NEW HAMPSHIRE									
Class B									
Plymouth State College	Public	995	64	0.064	18	19	2	0.018	661
Class C									
Keene State College	Public	1,320	314	0.238	21	21	-	0.016	785
Mount Saint Mary College	Denom.	283	-	0	11	11	-	0.039	293
NEW JERSEY									
Class C									
Bloomfield College	Denom.	903	-	0	15	15	-	0.017	720
Caldwell College for Women	Denom.	892	-	0	15	15	-	0.017	521
Monmouth College	Private	3,319	-	0	72	72	-	0.022	2,511
Newark State College	Public	3,799	672	0.177	28	28	-	0.007	1,797
Class D									
Paterson State College	Public	3,548	428	0.121	-	-	-	0	2,284
NEW MEXICO									
Class C									
St. Joseph on the Rio Grande, College of	Denom.	472	-	0	10	10	-	0.021	441
NEW YORK									
Class B									
St. Bernardine of Siena College	Denom.	2,019	169	0.084	171	168	1	0.085	1,507
State University College - Cortland	Public	3,562	344	0.097	51	48	1	0.014	2,713
State University College - Geneseo	Public	2,259	267	0.118	3	-	1	0.001	2,971
State University College - New Paltz	Public	3,453	330	0.096	18	15	1	0.005	3,273
State University College - Oneonta	Public	2,679	166	0.062	51	31	8	0.019	2,673
State University College - Plattsburgh	Public	2,539	67	0.026	47	32	6	0.019	2,432
Class C									
Bard College	Private	423	-	0	25	25	-	0.059	786
Finch College	Private	300	-	0	7	7	-	0.023	645

Table A-2.—Continued

A-2.6

	Control	Enrollment Total	Enrollment Graduate	R_e	S&T DP	BA	MA	R_s	EGI
NEW YORK (Cont'd)									
Harpur College, State University of New York	Public	2,012	46	0.023	117	117	-	0.058	2,414
Houghton College	Denom.	957	-	0	58	58	-	0.061	849
Ithaca College	Private	2,002	46	0.023	11	11	-	0.005	2,218
Ladycliffe College	Denom.	461	-	0	12	12	-	0.026	269
Manhattanville College of the Sacred Heart	Denom.	814	10	0.012	52	52	-	0.064	1,670
Marymount College	Denom.	775	-	0	69	69	-	0.089	1,075
Marymount Manhattan College	Denom.	550	-	0	54	54	-	0.098	505
Mount St. Joseph Teachers College	Denom.	475	98	0.206	2	2	-	0.004	400 *
Nazareth College of Rochester	Denom.	1,017	-	0	43	43	-	0.042	1,000 *
Roberts Wesleyan College	Denom.	513	-	0	12	12	-	0.023	417
State University College - Fredonia	Public	1,785	179	0.100	3	3	-	0.002	2,181
State University College - Oswego	Public	3,562	408	0.115	56	56	-	0.016	3,114
State University College - Potsdam	Public	2,109	148	0.070	21	21	-	0.010	3,107
Class D									
Mary Rogers College	Denom.	105	-	0	-	-	-	0	238
Mills College of Education	Private	270	-	0	-	-	-	0	523
State University College - Brockport	Public	2,459	441	0.179	-	-	-	0	2,773
NORTH CAROLINA									
Class C									
Atlantic Christian College	Denom.	1,297	-	0	50	50	-	0.039	771
Belmont Abbey College	Denom.	613	-	0	14	14	-	0.023	449
Elon College	Private	1,187	-	0	30	30	-	0.025	901
Greensboro College	Denom.	598	-	0	17	17	-	0.028	657
Guilford College	Denom.	1,481	5	0.003	53	53	-	0.036	1,020

High Point College	Denom.	1,311	-	0	35	35	-	0.027	957
Johnson C. Smith University	Denom.	1,027	-	0	59	59	-	0.057	960
Lenoir Rhyne College	Denom.	1,021	-	0	41	41	-	0.040	838
Livingstone College	Denom.	692	-	0	25	25	-	0.036	624
Meredith College	Denom.	824	-	0	31	31	-	0.038	767
Pembroke State College	Public	760	-	0	20	20	-	0.026	455
St. Andrews Presbyterian College	Denom.	941	-	0	12	12	-	0.013	1,009
Salem College	Denom.	488	-	0	19	19	-	0.039	633
Shaw University	Denom.	635	-	0	15	15	-	0.024	452
Class D									
Barber-Scotia College	Denom.	311	-	0	-	-	-	0	265
Fayetteville State College	Public	985	-	0	-	-	-	0	644
Winston-Salem State College	Public	1,212	-	0	-	-	-	0	981
NORTH DAKOTA									
Class C									
Dickinson State College	Public	877	-	0	23	23	-	0.026	510
Jamestown College	Denom.	417	-	0	36	36	-	0.086	498
Mayville State College	Public	690	-	0	26	26	-	0.038	480
Valley City State College	Public	913	-	0	35	35	-	0.038	762
OHIO									
Class C									
Bluffton College	Denom.	522	-	0	19	19	-	0.036	518
The Defiance College	Private	835	-	0	22	22	-	0.026	866
Lake Erie College	Private	869	-	0	27	27	-	0.031	983
Mary Manse College	Denom.	1,312	-	0	9	9	-	0.007	1,000 *
Otterbein College	Denom.	1,328	-	0	50	50	-	0.038	1,120
Ursuline College for Women	Denom.	319	-	0	23	23	-	0.072	191
Western College for Women	Private	446	-	0	25	25	-	0.056	590

Table A-2.—Continued

A-2.7

	Control	Enrollment Total	Enrollment Graduate	R_e	S&T DP	BA	MA	R_s	EGI
OHIO (Cont'd)									
Wilberforce University	Denom.	373	-	0	16	16	-	0.043	400 *
Class D The Athenaeum of Ohio	Denom.	530	27	0.051	-	-	-	0	591
OKLAHOMA									
Class B Central State College	Public	5,146	477	0.093	105	100	2	0.020	1,972
Class C Bethany Nazarene College	Denom.	1,092	-	0	34	34	-	0.031	690
East Central State College	Public	2,036	129	0.063	47	47	-	0.023	1,047
Langston University	Public	721	-	0	39	39	-	0.054	706
Northeastern State College	Public	3,047	186	0.061	107	107	-	0.035	1,381
Oklahoma College for Women	Public	640	-	0	11	11	-	0.017	648
Panhandle Agricultural and Mechanical College	Public	1,086	-	0	35	35	-	0.032	737
Phillips University	Denom.	1,208	26	0.022	39	39	-	0.032	1,034
OREGON									
Class B Eastern Oregon College	Public	1,161	10	0.009	22	7	6	0.019	1,084
Oregon College of Education	Public	1,405	39	0.028	27	19	3	0.019	1,525
Class C Cascade College	Private	298	-	0	8	8	-	0.027	253
George Fox College	Denom.	228	-	0	9	9	-	0.039	218
Lewis and Clark College	Denom.	1,174	7	0.006	77	77	-	0.066	1,316
Mt. Angel College	Denom.	309	-	0	2	2	-	0.006	178
Class D Northwest Christian College	Denom.	350	-	0	-	-	-	0	229
Warner Pacific College	Denom.	232	-	0	-	-	-	0	230

PENNSYLVANIA

Class C

Alliance College	Private	267	-	0	15	15	-	0.056	494
Bloomsburg State College	Public	2,040	49	0.024	86	86	-	0.042	1,708
Cedar Crest College	Denom.	487	-	0	18	18	-	0.037	636
Chestnut Hill College	Denom.	1,017	-	0	72	72	-	0.071	966
Cheyney State College	Public	922	-	0	9	9	-	0.010	899
Clarion State College	Public	2,238	-	0	81	81	-	0.036	1,527
Delaware Valley College of Science and Agriculture	Private	470	-	0	78	78	-	0.166	677
East Stroudsburg State College	Public	1,757	-	0	55	55	-	0.031	1,569
Elizabethtown College	Denom.	1,357	-	0	40	40	-	0.029	1,042
Gannon College	Denom.	1,979	-	0	105	105	-	0.053	1,166
Grove City College	Private	1,789	-	0	127	127	-	0.071	1,235
Holy Family College	Denom.	421	-	0	26	26	-	0.062	396
Immaculata College	Denom.	926	-	0	49	49	-	0.053	1,020
Kutztown State College	Public	2,061	64	0.031	54	54	-	0.026	1,941
Lycoming College	Denom.	1,316	-	0	106	106	-	0.081	1,389
Mansfield State College	Public	1,231	-	0	47	47	-	0.038	1,609
Messiah College	Denom.	232	-	0	7	7	-	0.030	258
Misericordia, College	Denom.	1,246	-	0	29	29	-	0.023	784
The Pennsylvania State College of Optometry	Private	132	-	0	21	21	-	0.159	247
Rosemont College	Denom.	598	-	0	38	38	-	0.064	549
St. Francis College	Denom.	1,250	-	0	51	51	-	0.041	1,082
Shippensburg State College	Public	1,763	112	0.064	67	67	-	0.038	1,354
Slippery Rock State College	Public	1,790	-	0	38	38	-	0.021	1,422
Susquehanna University	Denom.	939	-	0	60	60	-	0.064	1,229
Ursinus College	Denom.	1,446	-	0	137	137	-	0.095	1,105
Villa Maria College	Denom.	736	-	0	9	9	-	0.012	514

Table A-2.—Continued

	Control	Enrollment Total	Enrollment Graduate	R_e	S&T DP	BA	MA	R_s	EGI
PENNSYLVANIA (Cont'd)									
Washington and Jefferson College	Private	805	-	0	130	130	-	0.161	1,212
Waynesburg College	Denom.	1,039	-	0	68	68	-	0.065	911
Class D Academy of the New Church, College	Denom.	69	-	0	-	-	-	0	532
RHODE ISLAND									
Class C Barrington College	Private	435	-	0	12	12	-	0.02[illegible]	550
SOUTH CAROLINA									
Class C Benedict College	Denom.	975	-	0	48	48	-	0.049	631
Coker College for Women	Private	367	-	0	4	4	-	0.011	334
Converse College	Private	618	41	0.066	38	38	-	0.061	600 *
Landers College	Private	442	-	0	15	15	-	0.034	429
Limestone College	Private	485	-	0	11	11	-	0.023	335
Newberry College	Denom.	685	-	0	24	24	-	0.035	666
Presbyterian College	Denom.	511	-	0	33	33	-	0.065	566
Winthrop College	Public	2,233	13	0.006	46	46	-	0.021	1,954
Wofford College	Denom.	833	-	0	77	77	-	0.092	783
SOUTH DAKOTA									
Class C Black Hills Teachers College	Public	1,288	-	0	20	20	-	0.016	752
Dakota Wesleyan University	Denom.	614	-	0	16	16	-	0.026	464
General Beadle State Teachers College	Public	571	-	0	11	11	-	0.019	450
Huron College	Denom.	617	-	0	12	12	-	0.019	401
Mount Marty College	Denom.	325	-	0	2	2	-	0.006	295
Northern State College	Public	1,868	47	0.025	64	64	-	0.034	1,302

Sioux Falls College	Denom.	693	-	0	20	20	-	0.029	527
Southern State Teachers College	Public	661	-	0	11	11		0.017	733
Yankton College	Private	350	-	0	15	15	-	0.043	436
TENNESSEE									
Class C Bethel College	Denom.	528	-	0	11	11	-	0.021	305
Lambuth College	Denom.	652	-	0	27	27	-	0.041	474
Lane College	Denom.	537	-	0	28	28	-	0.052	405
Lincoln Memorial University	Private	510	-	0	28	28	-	0.055	391
Maryville College	Denom.	728	-	0	27	27	-	0.037	685
Milligan College	Private	594	-	0	10	10	-	0.017	470
Siena College	Denom.	324	-	0	10	10	-	0.031	165
Tusculum College	Private	499	-	0	18	18	-	0.036	380
Union University	Denom.	776	-	0	27	27	-	0.035	497
TEXAS									
Class B Hardin-Simmons University	Denom.	1,731	62	0.036	57	54	1	0.033	1,454
Class C Bishop College	Denom.	938	-	0	9	9	-	0.010	711
East Texas Baptist College	Denom.	569	-	0	9	9	-	0.016	453
Mary Hardin-Baylor College	Denom.	977	-	0	14	14	-	0.014	612
Texas Wesleyan College	Denom.	1,457	121	0.083	23	23	-	0.016	890
UTAH									
Class C Westminster College	Denom.	431	-	0	16	16	-	0.037	487
VERMONT									
Class C Norwich University	Private	1,150	-	0	109	109	-	0.095	1,428
St. Michael's College	Denom.	1,108	23	0.021	68	68	-	0.061	1,241
Trinity College	Denom.	427	-	0	19	19	-	0.044	182

Table A-2.—Continued

A-2.9

	Control	Enrollment		R_e	S&T DP	BA	MA	R_s	EGI
		Total	Graduate						
VERMONT (Cont'd)									
Class D									
Castleton State College	Public	570	-	0	-	-	-	0	451
Johnson State College	Public	260	-	0	-	-	-	0	259
VIRGINIA									
Class C									
Mary Baldwin College	Denom.	516	-	0	30	30	-	0.058	935
Randolph-Macon College	Denom.	667	-	0	44	44	-	0.066	712
Richmond Professional Institute	Public	4,761	114	0.024	72	72	-	0.015	2,303
Roanoke College	Denom.	911	-	0	39	39	-	0.043	867
Saint Paul's College	Denom.	406	-	0	7	7	-	0.017	461
WASHINGTON									
Class B									
Central Washington State College	Public	2,923	79	0.027	98	78	8	0.034	2,904
WEST VIRGINIA									
Class C									
Alderson-Broaddus College	Denom.	538	-	0	18	18	-	0.033	442
Bluefield State College	Public	609	-	0	7	7	-	0.011	646
Concord College	Public	1,602	-	0	50	50	-	0.031	1,161
Davis and Elkins College	Denom.	599	-	0	32	32	-	0.053	752
Glenville State College	Public	957	-	0	23	23	-	0.024	668
Salem College	Denom.	768	-	0	14	14	-	0.018	677
Shepherd College	Public	966	-	0	46	46	-	0.048	634
West Liberty State College	Public	1,696	-	0	19	19	-	0.011	801
West Virginia State College	Public	2,502	-	0	46	46	-	0.018	1,371

WISCONSIN									
Class C									
Carroll College	Denom.	931	-	0	75	75	-	0.081	1,184
Dominican College	Denom.	480	-	0	4	4	-	0.008	244
Holy Family College	Denom.	418	-	0	5	5	-	0.012	118
Lakeland College	Denom.	446	-	0	22	22	-	0.049	489
Marian College of Fond Du Lac	Denom.	410	-	0	1	1	-	0.002	116
Mount Mary College	Denom.	1,136	-	0	30	30	-	0.026	617
St. Norbert College	Denom.	1,188	-	0	72	72	-	0.061	831
Viterbo College	Denom.	416	-	0	12	12	-	0.029	201
Wisconsin State College - Whitewater	Public	3,625	-	0	42	42	-	0.012	2,676
Class D									
Stout State College	Public	1,672	-	0	-	-	-	0	1,667
PUERTO RICO									
Class C									
Sacred Heart, College of	Denom.	234	-	0	7	7	-	0.030	142

TABLE B-1
ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY LEVEL OF FEDERAL FUNDS FOR ACADEMIC SCIENCE
FISCAL YEAR 1963

RANK	INSTITUTION	DOLLARS (thousands)	RANK	INSTITUTION	DOLLARS (thousands)
1	COLUMBIA UNIVERSITY	42530	51	MICHIGAN STATE UNIVERSITY	6184
2	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	42361	52	ALABAMA, UNIVERSITY OF	6175
3	MICHIGAN, THE UNIVERSITY OF	36796	53	KANSAS, UNIVERSITY OF	6149
4	HARVARD UNIVERSITY	31251	54	RUTGERS -- THE STATE UNIVERSITY	6045
5	CALIFORNIA, UNIVERSITY OF -BERKELEY	29361	55	WAYNE STATE UNIVERSITY	5570
6	STANFORD UNIVERSITY	28938	56	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	5564
7	ILLINOIS, UNIVERSITY OF	28788	57	MISSOURI, UNIVERSITY OF	5502
8	CHICAGO, THE UNIVERSITY OF	24668	58	OREGON STATE UNIVERSITY	5481
9	MINNESOTA, UNIVERSITY OF	23966	59	BOSTON UNIVERSITY	5433
10	JOHNS HOPKINS UNIVERSITY	22632	60	VIRGINIA, UNIVERSITY OF	5249
11	WASHINGTON, UNIVERSITY OF	21363	61	EMORY UNIVERSITY	4984
12	PENNSYLVANIA, UNIVERSITY OF	20709	62	ARIZONA, THE UNIVERSITY OF	4943
13	CORNELL UNIVERSITY	20440	63	CARNEGIE INSTITUTE OF TECHNOLOGY	4933
14	WISCONSIN, UNIVERSITY OF	20340	64	FLORIDA STATE UNIVERSITY	4848
15	NEW YORK UNIVERSITY	19857	65	CALIFORNIA, UNIVERSITY OF- SAN FRANCISCO MEDICAL CTR.	4739
16	YALE UNIVERSITY	19472	66	TEXAS AGRICULTURAL AND MECHANICAL UNIVERSITY	4721
17	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	19196	67	CINCINNATI, UNIVERSITY OF	4713
18	TEXAS, UNIVERSITY OF	17850	68	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	4583
19	THE OHIO STATE UNIVERSITY	13883	69	GEORGE WASHINGTON UNIVERSITY	4372
20	PITTSBURGH, UNIVERSITY OF	13825	70	POLYTECHNIC INSTITUTE OF BROOKLYN	4238
21	ROCHESTER, UNIVERSITY OF	13092	71	TUFTS UNIVERSITY	4083
22	MARYLAND, UNIVERSITY OF	12849	72	STATE UNIVERSITY OF NEW YORK - BUFFALO	4022
23	WASHINGTON UNIVERSITY	12299	73	PUERTO RICO, UNIVERSITY OF	3983
24	DUKE UNIVERSITY	11737	74	GEORGETOWN UNIVERSITY	3960
25	COLORADO, UNIVERSITY OF	11473	75	CASE INSTITUTE OF TECHNOLOGY	3914
26	NORTHWESTERN UNIVERSITY	11179	76	NEBRASKA, UNIVERSITY OF	3874
27	CALIFORNIA, UNIVERSITY OF - SAN DIEGO	11084	77	ARKANSAS, UNIVERSITY OF	3736
28	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	10498	78	BRANDEIS UNIVERSITY	3690
29	PRINCETON UNIVERSITY	10382	79	RENSSELAER POLYTECHNIC INSTITUTE	3643
30	WESTERN RESERVE UNIVERSITY	9980	80	VERMONT, UNIVERSITY OF	3395
31	INDIANA UNIVERSITY	9880	81	TEMPLE UNIVERSITY	3389
32	YESHIVA UNIVERSITY	9714	82	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	3377
33	CALIFORNIA INSTITUTE OF TECHNOLOGY	9455	83	GEORGIA, THE UNIVERSITY OF	3332
34	PURDUE UNIVERSITY	9265	84	HAWAII, UNIVERSITY OF	3332
35	SOUTHERN CALIFORNIA, UNIVERSITY OF	8727	85	ROCKEFELLER INSTITUTE	3293
36	CALIFORNIA, UNIVERSITY OF - DAVIS	8475	86	GEORGIA INSTITUTE OF TECHNOLOGY	3198
37	UTAH, UNIVERSITY OF	8297	87	WEST VIRGINIA UNIVERSITY	3165
38	TULANE UNIVERSITY	8286	88	MISSISSIPPI, UNIVERSITY OF	3137
39	FLORIDA, UNIVERSITY OF	8278	89	VIRGINIA, MEDICAL COLLEGE OF	3098
40	OREGON, UNIVERSITY OF	7722	90	DARTMOUTH COLLEGE	3046
41	IOWA, UNIVERSITY OF	7294	91	WASHINGTON STATE UNIVERSITY	2977
42	THE PENNSYLVANIA STATE UNIVERSITY	7260	92	COLORADO STATE UNIVERSITY	2944
43	SYRACUSE UNIVERSITY	7073	93	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	2906
44	BROWN UNIVERSITY	6851	94	SAINT LOUIS UNIVERSITY	2904
45	MIAMI, UNIVERSITY OF	6822	95	DENVER, UNIVERSITY OF	2885
46	BAYLOR UNIVERSITY	6755	96	SETON HALL UNIVERSITY	2875
47	OKLAHOMA, UNIVERSITY OF	6681	97	LOUISVILLE, UNIVERSITY OF	2825
48	VANDERBILT UNIVERSITY	6345	98	UTAH STATE UNIVERSITY	2820
49	KENTUCKY, UNIVERSITY OF	6312	99	THE CATHOLIC UNIVERSITY OF AMERICA	2768
50	TENNESSEE, UNIVERSITY OF	6258	100	KANSAS STATE UNIVERSITY	2718

TABLE B-2
ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY EDUCATIONAL AND GENERAL INCOME
ACADEMIC YEAR 1962-1963

RANK	INSTITUTION	DOLLARS (thousands)	RANK	INSTITUTION	DOLLARS (thousands)
1	ILLINOIS, UNIVERSITY OF	107666	51	BOSTON UNIVERSITY	18436
2	CORNELL UNIVERSITY	70761	52	KANSAS, UNIVERSITY OF	18365
3	MINNESOTA, UNIVERSITY OF	69781	53	TEMPLE UNIVERSITY	18112
4	PENNSYLVANIA, UNIVERSITY OF	65361	54	CALIFORNIA, UNIVERSITY OF - DAVIS	18047
5	MICHIGAN, THE UNIVERSITY OF	58630	55	GEORGETOWN UNIVERSITY	18000
6	NEW YORK UNIVERSITY	57257	56	WEST VIRGINIA UNIVERSITY	17978
7	TEXAS, UNIVERSITY OF	55268	57	TULANE UNIVERSITY	17503
8	CALIFORNIA, UNIVERSITY OF -BERKELEY	55095	58	AUBURN UNIVERSITY	17489
9	HARVARD UNIVERSITY	54824	59	THE CITY UNIVERSITY OF NEW YORK - THE CITY COLLEGE	17357
10	WISCONSIN, UNIVERSITY OF	50861	60	WASHINGTON UNIVERSITY	17213
11	THE OHIO STATE UNIVERSITY	49060	61	VIRGINIA POLYTECHNIC INSTITUTE	16778
12	COLUMBIA UNIVERSITY	45563	62	GEORGE WASHINGTON UNIVERSITY	16700
13	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	45100	63	DUKE UNIVERSITY	16586
14	THE PENNSYLVANIA STATE UNIVERSITY	44701	64	KANSAS STATE UNIVERSITY	16305
15	STANFORD UNIVERSITY	43352	65	UTAH, UNIVERSITY OF	16256
16	PRINCETON UNIVERSITY	43021	66	CALIFORNIA, UNIVERSITY OF- SAN FRANCISCO MEDICAL CTR.	16159
17	MISSOURI, UNIVERSITY OF	41837	67	THE CITY UNIVERSITY OF NEW YORK - HUNTER COLLEGE	15599
18	MICHIGAN STATE UNIVERSITY	41247	68	HAWAII, UNIVERSITY OF	15374
19	FLORIDA, UNIVERSITY OF	40810	69	MIAMI, UNIVERSITY OF	15261
20	PURDUE UNIVERSITY	39706	70	SAN JOSE STATE COLLEGE	15156
21	INDIANA UNIVERSITY	39176	71	CINCINNATI, UNIVERSITY OF	14972
22	WASHINGTON, UNIVERSITY OF	38111	72	CONNECTICUT, UNIVERSITY OF	14552
23	YALE UNIVERSITY	34378	73	ALABAMA, UNIVERSITY OF	14544
24	IOWA, UNIVERSITY OF	32765	74	JOHNS HOPKINS UNIVERSITY	14248
25	MARYLAND, UNIVERSITY OF	32656	75	NOTRE DAME, UNIVERSITY OF	14125
26	TENNESSEE, UNIVERSITY OF	30872	76	MASSACHUSETTS, UNIVERSITY OF	13971
27	RUTGERS -- THE STATE UNIVERSITY	28314	77	COLORADO STATE UNIVERSITY	13889
28	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	27525	78	ARKANSAS, UNIVERSITY OF	13472
29	WAYNE STATE UNIVERSITY	27309	79	THE CITY UNIVERSITY OF NEW YORK - BROOKLYN COLLEGE	13317
30	KENTUCKY, UNIVERSITY OF	26828	80	SAINT LOUIS UNIVERSITY	13265
31	COLORADO, UNIVERSITY OF	26131	81	WESTERN RESERVE UNIVERSITY	13046
32	PITTSBURGH, UNIVERSITY OF	26092	82	MISSISSIPPI STATE UNIVERSITY	12719
33	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	25584	83	OREGON, UNIVERSITY OF	12627
34	PUERTO RICO, UNIVERSITY OF	25567	84	FLORIDA STATE UNIVERSITY	12303
35	ROCHESTER, UNIVERSITY OF	25513	85	CALIFORNIA STATE COLLEGE AT LOS ANGELES	11970
36	NORTHWESTERN UNIVERSITY	24175	86	BROWN UNIVERSITY	11948
37	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	23383	87	BRIGHAM YOUNG UNIVERSITY	11815
38	VIRGINIA, UNIVERSITY OF	22426	88	DARTMOUTH COLLEGE	11780
39	CHICAGO, THE UNIVERSITY OF	22375	89	VANDERBILT UNIVERSITY	11502
40	NEBRASKA, UNIVERSITY OF	22370	90	STATE UNIVERSITY OF NEW YORK - BUFFALO	11432
41	GEORGIA, THE UNIVERSITY OF	22020	91	HOWARD UNIVERSITY	11371
42	SOUTHERN ILLINOIS UNIVERSITY	21916	92	ARIZONA STATE UNIVERSITY	11311
43	WASHINGTON STATE UNIVERSITY	21599	93	SAN FRANCISCO STATE COLLEGE	11237
44	ARIZONA, THE UNIVERSITY OF	21525	94	KENT STATE UNIVERSITY	11208
45	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	20631	95	ST. JOHN'S UNIVERSITY	10904
46	SOUTHERN CALIFORNIA, UNIVERSITY OF	20589	96	SAN DIEGO STATE COLLEGE	10886
47	SYRACUSE UNIVERSITY	20571	97	CALIFORNIA STATE POLYTECHNIC COLLEGE	10867
48	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	19769	98	UTAH STATE UNIVERSITY	10649
49	OREGON STATE UNIVERSITY	19468	99	OHIO UNIVERSITY	10407
50	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	19332	100	NORTHERN ILLINOIS UNIVERSITY	9887

TABLE B-3
ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY RESEARCH AND EDUCATIONAL INCOME
ACADEMIC YEAR 1962-1963

RANK	INSTITUTION	DOLLARS (thousands)
1	ILLINOIS, UNIVERSITY OF	136454
2	MICHIGAN, THE UNIVERSITY OF	95426
3	MINNESOTA, UNIVERSITY OF	93747
4	CORNELL UNIVERSITY	91201
5	COLUMBIA UNIVERSITY	88093
6	HARVARD UNIVERSITY	86075
7	PENNSYLVANIA, UNIVERSITY OF	86070
8	CALIFORNIA, UNIVERSITY OF -BERKELEY	84456
9	NEW YORK UNIVERSITY	77114
10	TEXAS, UNIVERSITY OF	73118
11	STANFORD UNIVERSITY	72290
12	WISCONSIN, UNIVERSITY OF	71201
13	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	64296
14	THE OHIO STATE UNIVERSITY	62943
15	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	61693
16	WASHINGTON, UNIVERSITY OF	59474
17	YALE UNIVERSITY	53850
18	PRINCETON UNIVERSITY	53403
19	THE PENNSYLVANIA STATE UNIVERSITY	51961
20	FLORIDA, UNIVERSITY OF	49088
21	INDIANA UNIVERSITY	49056
22	PURDUE UNIVERSITY	48971
23	MICHIGAN STATE UNIVERSITY	47431
24	MISSOURI, UNIVERSITY OF	47339
25	CHICAGO, THE UNIVERSITY OF	47043
26	MARYLAND, UNIVERSITY OF	45505
27	IOWA, UNIVERSITY OF	40059
28	PITTSBURGH, UNIVERSITY OF	39917
29	ROCHESTER, UNIVERSITY OF	38605
30	COLORADO, UNIVERSITY OF	37604
31	TENNESSEE, UNIVERSITY OF	37130
32	JOHNS HOPKINS UNIVERSITY	36875
33	NORTHWESTERN UNIVERSITY	35354
34	RUTGERS -- THE STATE UNIVERSITY	34359
35	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	33881
36	KENTUCKY, UNIVERSITY OF	33140
37	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	33089
38	WAYNE STATE UNIVERSITY	32879
39	PUERTO RICO, UNIVERSITY OF	29550
40	WASHINGTON UNIVERSITY	29512
41	SOUTHERN CALIFORNIA, UNIVERSITY OF	29316
42	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	28490
43	DUKE UNIVERSITY	28323
44	VIRGINIA, UNIVERSITY OF	27675
45	SYRACUSE UNIVERSITY	27644
46	CALIFORNIA, UNIVERSITY OF - DAVIS	26522
47	ARIZONA, THE UNIVERSITY OF	26468
48	NEBRASKA, UNIVERSITY OF	26244
49	TULANE UNIVERSITY	25789
50	GEORGIA, THE UNIVERSITY OF	25352
51	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	25214
52	OREGON STATE UNIVERSITY	24949
53	WASHINGTON STATE UNIVERSITY	24576
54	UTAH, UNIVERSITY OF	24553
55	KANSAS, UNIVERSITY OF	24512
56	BOSTON UNIVERSITY	23869
57	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	23146
58	WESTERN RESERVE UNIVERSITY	23026
59	SOUTHERN ILLINOIS UNIVERSITY	22688
60	MIAMI, UNIVERSITY OF	22083
61	GEORGETOWN UNIVERSITY	21960
62	TEMPLE UNIVERSITY	21501
63	WEST VIRGINIA UNIVERSITY	21143
64	GEORGE WASHINGTON UNIVERSITY	21072
65	CALIFORNIA, UNIVERSITY OF- SAN FRANCISCO MEDICAL CTR.	20898
66	ALABAMA, UNIVERSITY OF	20719
67	OREGON, UNIVERSITY OF	20349
68	CINCINNATI, UNIVERSITY OF	19685
69	KANSAS STATE UNIVERSITY	19023
70	VIRGINIA POLYTECHNIC INSTITUTE	18949
71	BROWN UNIVERSITY	18799
72	HAWAII, UNIVERSITY OF	18706
73	AUBURN UNIVERSITY	18595
74	CALIFORNIA INSTITUTE OF TECHNOLOGY	18176
75	THE CITY UNIVERSITY OF NEW YORK - THE CITY COLLEGE	17933
76	VANDERBILT UNIVERSITY	17847
77	ARKANSAS, UNIVERSITY OF	17208
78	FLORIDA STATE UNIVERSITY	17151
79	COLORADO STATE UNIVERSITY	16833
80	YESHIVA UNIVERSITY	16749
81	CONNECTICUT, UNIVERSITY OF	16688
82	NOTRE DAME, UNIVERSITY OF	16654
83	OKLAHOMA, UNIVERSITY OF	16425
84	CALIFORNIA, UNIVERSITY OF - SAN DIEGO	16324
85	SAINT LOUIS UNIVERSITY	16169
86	THE CITY UNIVERSITY OF NEW YORK - HUNTER COLLEGE	15956
87	MASSACHUSETTS, UNIVERSITY OF	15916
88	SAN JOSE STATE COLLEGE	15761
89	STATE UNIVERSITY OF NEW YORK - BUFFALO	15454
90	DARTMOUTH COLLEGE	14826
91	MISSISSIPPI STATE UNIVERSITY	14511
92	THE CITY UNIVERSITY OF NEW YORK - BROOKLYN COLLEGE	13737
93	UTAH STATE UNIVERSITY	13469
94	TEXAS AGRICULTURAL AND MECHANICAL UNIVERSITY	13197
95	HOWARD UNIVERSITY	13193
96	ARIZONA STATE UNIVERSITY	12955
97	BRIGHAM YOUNG UNIVERSITY	12399
98	MARQUETTE UNIVERSITY	12343
99	EMORY UNIVERSITY	12318
100	CARNEGIE INSTITUTE OF TECHNOLOGY	12314

TABLE B-4
ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY TOTAL ENROLLMENT
ACADEMIC YEAR 1962-1963

RANK	INSTITUTION	ENROLLMENT	RANK	INSTITUTION	ENROLLMENT
1	MINNESOTA, UNIVERSITY OF	45849	51	FLORIDA, UNIVERSITY OF	13826
2	WISCONSIN, UNIVERSITY OF	35251	52	HOUSTON, UNIVERSITY OF	13665
3	ILLINOIS, UNIVERSITY OF	33956	53	HARVARD UNIVERSITY	13646
4	NEW YORK UNIVERSITY	33232	54	THE CITY UNIVERSITY OF NEW YORK - QUEENS COLLEGE	13642
5	INDIANA UNIVERSITY	31581	55	UTAH, UNIVERSITY OF	13448
6	THE OHIO STATE UNIVERSITY	30500	56	OHIO UNIVERSITY	13422
7	THE CITY UNIVERSITY OF NEW YORK - THE CITY COLLEGE	30307	57	BRIGHAM YOUNG UNIVERSITY	13352
8	MICHIGAN, THE UNIVERSITY OF	30152	58	CONNECTICUT, UNIVERSITY OF	13070
9	MICHIGAN STATE UNIVERSITY	28826	59	VIRGINIA, UNIVERSITY OF	12899
10	MARYLAND, UNIVERSITY OF	25361	60	LONG BEACH STATE COLLEGE	12889
11	RUTGERS — THE STATE UNIVERSITY	25340	61	CORNELL UNIVERSITY	12687
12	CALIFORNIA, UNIVERSITY OF -BERKELEY	25092	62	WESTERN MICHIGAN UNIVERSITY	12597
13	COLUMBIA UNIVERSITY	24000	63	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	12529
14	WASHINGTON, UNIVERSITY OF	23906	64	GEORGIA, THE UNIVERSITY OF	12247
15	TEXAS, UNIVERSITY OF	23747	65	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	12179
16	MISSOURI, UNIVERSITY OF	23204	66	IOWA, UNIVERSITY OF	12114
17	PURDUE UNIVERSITY	22316	67	MIAMI, UNIVERSITY OF	12053
18	PUERTO RICO, UNIVERSITY OF	21454	68	MIAMI UNIVERSITY	11700
19	WAYNE STATE UNIVERSITY	20836	69	ST. JOHN'S UNIVERSITY	11594
20	TEMPLE UNIVERSITY	20698	70	HAWAII, UNIVERSITY OF	11575
21	THE CITY UNIVERSITY OF NEW YORK - HUNTER COLLEGE	20531	71	KANSAS, UNIVERSITY OF	11434
22	SAN JOSE STATE COLLEGE	20354	72	KENTUCKY, UNIVERSITY OF	11242
23	THE CITY UNIVERSITY OF NEW YORK - BROOKLYN COLLEGE	20314	73	TEXAS TECHNOLOGICAL COLLEGE	11181
24	CINCINNATI, UNIVERSITY OF	20261	74	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	10887
25	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	20189	75	NORTH TEXAS STATE UNIVERSITY	10657
26	SYRACUSE UNIVERSITY	19878	76	OREGON, UNIVERSITY OF	10609
27	THE PENNSYLVANIA STATE UNIVERSITY	19706	77	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	10517
28	NORTHEASTERN UNIVERSITY	19664	78	LONG ISLAND UNIVERSITY	10438
29	BOSTON UNIVERSITY	19589	79	NEBRASKA, UNIVERSITY OF	10401
30	COLORADO, UNIVERSITY OF	19557	80	FLORIDA STATE UNIVERSITY	10391
31	CALIFORNIA STATE COLLEGE AT LOS ANGELES	18557	81	LOYOLA UNIVERSITY	10354
32	SOUTHERN CALIFORNIA, UNIVERSITY OF	18477	82	DETROIT, UNIVERSITY OF	10345
33	PENNSYLVANIA, UNIVERSITY OF	18347	83	MARQUETTE UNIVERSITY	10078
34	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	18338	84	OREGON STATE UNIVERSITY	10026
35	TENNESSEE, UNIVERSITY OF	17394	85	STANFORD UNIVERSITY	9934
36	TEXAS AGRICULTURAL AND MECHANICAL UNIVERSITY	17216	86	NORTHERN ILLINOIS UNIVERSITY	9863
37	SAN FRANCISCO STATE COLLEGE	17024	87	WEST VIRGINIA UNIVERSITY	9565
38	SOUTHERN ILLINOIS UNIVERSITY	16843	88	HOFSTRA UNIVERSITY	9351
39	NORTHWESTERN UNIVERSITY	16636	89	CALIFORNIA STATE POLYTECHNIC COLLEGE	9297
40	ARIZONA, THE UNIVERSITY OF	16275	90	SACRAMENTO STATE COLLEGE	9251
41	FAIRLEIGH DICKINSON UNIVERSITY	15901	91	THE AMERICAN UNIVERSITY	9181
42	STATE UNIVERSITY OF NEW YORK - BUFFALO	15714	92	DE PAUL UNIVERSITY	9147
43	ARIZONA STATE UNIVERSITY	15453	93	SETON HALL UNIVERSITY	9087
44	SAN DIEGO STATE COLLEGE	14661	94	SAINT LOUIS UNIVERSITY	9045
45	WASHINGTON UNIVERSITY	14602	95	SAN FERNANDO VALLEY STATE COLLEGE	9045
46	ALABAMA, UNIVERSITY OF	14477	96	AUBURN UNIVERSITY	8982
47	KENT STATE UNIVERSITY	14455	97	FORDHAM UNIVERSITY	8951
48	GEORGE WASHINGTON UNIVERSITY	14031	98	KANSAS STATE UNIVERSITY	8909
49	PITTSBURGH, UNIVERSITY OF	13938	99	BOSTON COLLEGE	8902
50	OKLAHOMA, UNIVERSITY OF	13928	100	FRESNO STATE COLLEGE	8663

TABLE B-5
ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY ENROLLMENT FOR GRADUATE STUDIES
ACADEMIC YEAR 1962-1963

RANK	INSTITUTION	ENROLLMENT	RANK	INSTITUTION	ENROLLMENT
1	NEW YORK UNIVERSITY	12040	51	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	1914
2	COLUMBIA UNIVERSITY	8503	52	ARIZONA, THE UNIVERSITY OF	1913
3	MICHIGAN, THE UNIVERSITY OF	7401	53	OKLAHOMA, UNIVERSITY OF	1902
4	SOUTHERN CALIFORNIA, UNIVERSITY OF	7035	54	SAN FRANCISCO STATE COLLEGE	1891
5	CALIFORNIA, UNIVERSITY OF -BERKELEY	6822	55	KANSAS, UNIVERSITY OF	1878
6	MINNESOTA, UNIVERSITY OF	6010	56	SAINT LOUIS UNIVERSITY	1812
7	WISCONSIN, UNIVERSITY OF	5855	57	NORTHERN ILLINOIS UNIVERSITY	1790
8	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	5505	58	SAN DIEGO STATE COLLEGE	1772
9	PENNSYLVANIA, UNIVERSITY OF	5448	59	SETON HALL UNIVERSITY	1750
10	ILLINOIS, UNIVERSITY OF	5325	60	TENNESSEE, UNIVERSITY OF	1727
11	TEMPLE UNIVERSITY	5069	61	CONNECTICUT, UNIVERSITY OF	1694
12	MARYLAND, UNIVERSITY OF	4555	62	SAN JOSE STATE COLLEGE	1681
13	THE OHIO STATE UNIVERSITY	4316	63	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	1660
14	WAYNE STATE UNIVERSITY	4209	64	FORDHAM UNIVERSITY	1639
15	RUTGERS -- THE STATE UNIVERSITY	4073	65	JOHNS HOPKINS UNIVERSITY	1565
16	MICHIGAN STATE UNIVERSITY	3983	66	NORTHWESTERN UNIVERSITY	1551
17	PITTSBURGH, UNIVERSITY OF	3729	67	BOSTON UNIVERSITY	1551
18	INDIANA UNIVERSITY	3694	68	DREXEL INSTITUTE OF TECHNOLOGY	1494
19	CALIFORNIA STATE COLLEGE AT LOS ANGELES	3683	69	NEBRASKA, UNIVERSITY OF	1454
20	HARVARD UNIVERSITY	3618	70	FLORIDA STATE UNIVERSITY	1452
21	THE CITY UNIVERSITY OF NEW YORK - THE CITY COLLEGE	3493	71	ALABAMA, UNIVERSITY OF	1444
22	WASHINGTON, UNIVERSITY OF	3409	72	OREGON, UNIVERSITY OF	1436
23	ARIZONA STATE UNIVERSITY	3319	73	LONG BEACH STATE COLLEGE	1428
24	STANFORD UNIVERSITY	3200	74	RENSSELAER POLYTECHNIC INSTITUTE	1426
25	PURDUE UNIVERSITY	3099	75	XAVIER UNIVERSITY	1408
26	GEORGE WASHINGTON UNIVERSITY	2892	76	NEW MEXICO, THE UNIVERSITY OF	1400
27	MISSOURI, UNIVERSITY OF	2890	77	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	1376
28	CHICAGO, THE UNIVERSITY OF	2853	78	ROCHESTER, UNIVERSITY OF	1369
29	SYRACUSE UNIVERSITY	2741	79	BOSTON COLLEGE	1358
30	TEXAS, UNIVERSITY OF	2735	80	THE AMERICAN UNIVERSITY	1327
31	POLYTECHNIC INSTITUTE OF BROOKLYN	2690	81	ILLINOIS INSTITUTE OF TECHNOLOGY	1318
32	CORNELL UNIVERSITY	2648	82	NORTH TEXAS STATE UNIVERSITY	1310
33	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	2637	83	SOUTHERN ILLINOIS UNIVERSITY	1301
34	WESTERN RESERVE UNIVERSITY	2606	84	WESTERN MICHIGAN UNIVERSITY	1295
35	IOWA, UNIVERSITY OF	2558	85	BALL STATE TEACHERS COLLEGE	1289
36	YALE UNIVERSITY	2436	86	DETROIT, UNIVERSITY OF	1280
37	EASTERN MICHIGAN UNIVERSITY	2366	87	HARTFORD, UNIVERSITY OF	1259
38	THE PENNSYLVANIA STATE UNIVERSITY	2301	88	SANTA CLARA, UNIVERSITY OF	1252
39	NORTHEASTERN UNIVERSITY	2263	89	SAN FERNANDO VALLEY STATE COLLEGE	1239
40	THE CITY UNIVERSITY OF NEW YORK - HUNTER COLLEGE	2259	90	HOUSTON, UNIVERSITY OF	1239
41	THE CATHOLIC UNIVERSITY OF AMERICA	2202	91	ADELPHI UNIVERSITY	1234
42	UTAH, UNIVERSITY OF	2158	92	DE PAUL UNIVERSITY	1224
43	HOFSTRA UNIVERSITY	2154	93	LOYOLA UNIVERSITY	1198
44	WASHINGTON UNIVERSITY	2081	94	CINCINNATI, UNIVERSITY OF	1187
45	STATE UNIVERSITY OF NEW YORK - BUFFALO	2065	95	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	1169
46	FLORIDA, UNIVERSITY OF	2040	96	LEHIGH UNIVERSITY	1148
47	COLORADO, UNIVERSITY OF	2030	97	STATE COLLEGE AT BRIDGEWATER	1143
48	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	2002	98	GEORGETOWN UNIVERSITY	1132
49	ST. JOHN'S UNIVERSITY	1984	99	VIRGINIA, UNIVERSITY OF	1110
50	THE CITY UNIVERSITY OF NEW YORK - BROOKLYN COLLEGE	1976	100	TULANE UNIVERSITY	1095

TABLE 9-6

ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY COMMITMENT TO EDUCATION IN THE SCIENCES (S&T DP)

ACADEMIC YEAR 1962-1963

RANK	INSTITUTION	S&T DP UNITS
1	ILLINOIS, UNIVERSITY OF	6105
2	MICHIGAN, THE UNIVERSITY OF	5396
3	CALIFORNIA, UNIVERSITY OF -BERKELEY	4848
4	PURDUE UNIVERSITY	4479
5	NEW YORK UNIVERSITY	4450
6	WISCONSIN, UNIVERSITY OF	4427
7	MINNESOTA, UNIVERSITY OF	4162
8	THE OHIO STATE UNIVERSITY	4055
9	COLUMBIA UNIVERSITY	3650
10	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	3503
11	TEXAS, UNIVERSITY OF	3419
12	MISSOURI, UNIVERSITY OF	3174
13	STANFORD UNIVERSITY	3145
14	HARVARD UNIVERSITY	3119
15	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	3035
16	WASHINGTON, UNIVERSITY OF	2909
17	CORNELL UNIVERSITY	2789
18	THE PENNSYLVANIA STATE UNIVERSITY	2758
19	PENNSYLVANIA, UNIVERSITY OF	2711
20	MICHIGAN STATE UNIVERSITY	2658
21	TENNESSEE, UNIVERSITY OF	2529
22	NORTHWESTERN UNIVERSITY	2301
23	INDIANA UNIVERSITY	2226
24	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	2173
25	SOUTHERN CALIFORNIA, UNIVERSITY OF	2127
26	MARYLAND, UNIVERSITY OF	2099
27	IOWA, UNIVERSITY OF	2081
28	CHICAGO, THE UNIVERSITY OF	1977
29	PITTSBURGH, UNIVERSITY OF	1942
30	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	1931
31	THE CITY UNIVERSITY OF NEW YORK - THE CITY COLLEGE	1919
32	RUTGERS -- THE STATE UNIVERSITY	1868
33	YALE UNIVERSITY	1868
34	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	1851
35	COLORADO, UNIVERSITY OF	1843
36	FLORIDA, UNIVERSITY OF	1728
37	WAYNE STATE UNIVERSITY	1599
38	OKLAHOMA, UNIVERSITY OF	1591
39	KANSAS, UNIVERSITY OF	1567
40	TEMPLE UNIVERSITY	1556
41	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	1539
42	NEBRASKA, UNIVERSITY OF	1522
43	MARQUETTE UNIVERSITY	1416
44	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	1407
45	TEXAS AGRICULTURAL AND MECHANICAL UNIVERSITY	1400
46	WASHINGTON UNIVERSITY	1372
47	OREGON STATE UNIVERSITY	1359
48	RENSSELAER POLYTECHNIC INSTITUTE	1356
49	KANSAS STATE UNIVERSITY	1351
50	UTAH, UNIVERSITY OF	1332
51	OREGON, UNIVERSITY OF	1276
52	PRINCETON UNIVERSITY	1264
53	TUFTS UNIVERSITY	1246
54	CINCINNATI, UNIVERSITY OF	1246
55	SAINT LOUIS UNIVERSITY	1244
56	NOTRE DAME, UNIVERSITY OF	1239
57	ALABAMA, UNIVERSITY OF	1237
58	DUKE UNIVERSITY	1225
59	BOSTON UNIVERSITY	1212
60	POLYTECHNIC INSTITUTE OF BROOKLYN	1204
61	SYRACUSE UNIVERSITY	1196
62	JOHNS HOPKINS UNIVERSITY	1181
63	VIRGINIA POLYTECHNIC INSTITUTE	1180
64	STATE UNIVERSITY OF NEW YORK - BUFFALO	1162
65	HOWARD UNIVERSITY	1131
66	GEORGETOWN UNIVERSITY	1119
67	GEORGE WASHINGTON UNIVERSITY	1114
68	ARKANSAS, UNIVERSITY OF	1114
69	ARIZONA, THE UNIVERSITY OF	1096
70	GEORGIA INSTITUTE OF TECHNOLOGY	1093
71	VIRGINIA, UNIVERSITY OF	1091
72	THE CITY UNIVERSITY OF NEW YORK - BROOKLYN COLLEGE	1090
73	BAYLOR UNIVERSITY	1088
74	ROCHESTER, UNIVERSITY OF	1054
75	DREXEL INSTITUTE OF TECHNOLOGY	1046
76	WESTERN RESERVE UNIVERSITY	1041
77	WEST VIRGINIA UNIVERSITY	1038
78	GEORGIA, THE UNIVERSITY OF	1025
79	LOYOLA UNIVERSITY	1023
80	CONNECTICUT, UNIVERSITY OF	1023
81	NORTHEASTERN UNIVERSITY	1012
82	CARNEGIE INSTITUTE OF TECHNOLOGY	1005
83	TULANE UNIVERSITY	1001
84	MASSACHUSETTS, UNIVERSITY OF	976
85	WASHINGTON STATE UNIVERSITY	966
86	EMORY UNIVERSITY	960
87	PUERTO RICO, UNIVERSITY OF	959
88	LOUISVILLE, UNIVERSITY OF	931
89	CALIFORNIA, UNIVERSITY OF - DAVIS	926
90	VIRGINIA, MEDICAL COLLEGE OF	921
91	ILLINOIS INSTITUTE OF TECHNOLOGY	915
92	DETROIT, UNIVERSITY OF	907
93	COLORADO STATE UNIVERSITY	896
94	THE CITY UNIVERSITY OF NEW YORK - HUNTER COLLEGE	867
95	AUBURN UNIVERSITY	863
96	MIAMI, UNIVERSITY OF	859
97	CALIFORNIA, UNIVERSITY OF- SAN FRANCISCO MEDICAL CTR.	858
98	CALIFORNIA INSTITUTE OF TECHNOLOGY	856
99	SAN JOSE STATE COLLEGE	821
100	VANDERBILT UNIVERSITY	803

TABLE B-7

ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY DOCTORAL DEGREES IN SCIENCE AND ENGINEERING

ACADEMIC YEAR 1962-1963

RANK	INSTITUTION	DEGREES
1	ILLINOIS, UNIVERSITY OF	318
2	CALIFORNIA, UNIVERSITY OF -BERKELEY	317
3	WISCONSIN, UNIVERSITY OF	302
4	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	272
5	PURDUE UNIVERSITY	255
6	HARVARD UNIVERSITY	244
7	MICHIGAN, THE UNIVERSITY OF	237
8	MINNESOTA, UNIVERSITY OF	203
9	COLUMBIA UNIVERSITY	202
10	THE OHIO STATE UNIVERSITY	200
11	STANFORD UNIVERSITY	181
12	CHICAGO, THE UNIVERSITY OF	169
13	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	166
14	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	157
15	CORNELL UNIVERSITY	155
16	NEW YORK UNIVERSITY	145
17	TEXAS, UNIVERSITY OF	137
18	THE PENNSYLVANIA STATE UNIVERSITY	132
19	PRINCETON UNIVERSITY	125
20	MICHIGAN STATE UNIVERSITY	123
21	YALE UNIVERSITY	117
22	WASHINGTON, UNIVERSITY OF	116
23	NORTHWESTERN UNIVERSITY	107
24	INDIANA UNIVERSITY	103
25	PENNSYLVANIA, UNIVERSITY OF	95
26	CALIFORNIA INSTITUTE OF TECHNOLOGY	90
27	IOWA, UNIVERSITY OF	85
28	MARYLAND, UNIVERSITY OF	85
29	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	83
30	RUTGERS -- THE STATE UNIVERSITY	83
31	JOHNS HOPKINS UNIVERSITY	75
32	PITTSBURGH, UNIVERSITY OF	75
33	DUKE UNIVERSITY	74
34	COLORADO, UNIVERSITY OF	71
35	CARNEGIE INSTITUTE OF TECHNOLOGY	71
36	UTAH, UNIVERSITY OF	67
37	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	66
38	KANSAS, UNIVERSITY OF	63
39	CALIFORNIA, UNIVERSITY OF - DAVIS	62
40	FLORIDA, UNIVERSITY OF	62
41	ROCHESTER, UNIVERSITY OF	59
42	OREGON STATE UNIVERSITY	58
43	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	54
44	TENNESSEE, UNIVERSITY OF	54
45	SOUTHERN CALIFORNIA, UNIVERSITY OF	53
46	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	53
47	BROWN UNIVERSITY	52
48	WASHINGTON UNIVERSITY	51
49	MISSOURI, UNIVERSITY OF	51
50	POLYTECHNIC INSTITUTE OF BROOKLYN	51
51	OKLAHOMA, UNIVERSITY OF	50
52	NEBRASKA, UNIVERSITY OF	47
53	SYRACUSE UNIVERSITY	46
54	TEXAS AGRICULTURAL AND MECHANICAL UNIVERSITY	45
55	CASE INSTITUTE OF TECHNOLOGY	44
56	VIRGINIA, UNIVERSITY OF	44
57	RENSSELAER POLYTECHNIC INSTITUTE	42
58	ILLINOIS INSTITUTE OF TECHNOLOGY	41
59	NOTRE DAME, UNIVERSITY OF	41
60	FLORIDA STATE UNIVERSITY	38
61	WAYNE STATE UNIVERSITY	38
62	FORDHAM UNIVERSITY	38
63	THE CATHOLIC UNIVERSITY OF AMERICA	36
64	WESTERN RESERVE UNIVERSITY	35
65	ARIZONA, THE UNIVERSITY OF	35
66	CINCINNATI, UNIVERSITY OF	34
67	WASHINGTON STATE UNIVERSITY	34
68	VANDERBILT UNIVERSITY	33
69	GEORGIA INSTITUTE OF TECHNOLOGY	31
70	TULANE UNIVERSITY	30
71	OREGON, UNIVERSITY OF	30
72	CONNECTICUT, UNIVERSITY OF	29
73	BOSTON UNIVERSITY	29
74	GEORGETOWN UNIVERSITY	27
75	KANSAS STATE UNIVERSITY	27
76	RICE (WILLIAM MARSH) UNIVERSITY	27
77	MASSACHUSETTS, UNIVERSITY OF	26
78	SAINT LOUIS UNIVERSITY	26
79	GEORGIA, THE UNIVERSITY OF	24
80	UTAH STATE UNIVERSITY	24
81	STATE UNIVERSITY OF NEW YORK - BUFFALO	23
82	LEHIGH UNIVERSITY	23
83	DELAWARE, UNIVERSITY OF	22
84	VIRGINIA POLYTECHNIC INSTITUTE	22
85	BRANDEIS UNIVERSITY	21
86	ALABAMA, UNIVERSITY OF	21
87	CALIFORNIA, UNIVERSITY OF- SAN FRANCISCO MEDICAL CTR.	20
88	COLORADO STATE UNIVERSITY	19
89	KENTUCKY, UNIVERSITY OF	18
90	GEORGE WASHINGTON UNIVERSITY	17
91	THE AMERICAN UNIVERSITY	17
92	NEW MEXICO, THE UNIVERSITY OF	17
93	STEVENS INSTITUTE OF TECHNOLOGY	16
94	ROCKEFELLER INSTITUTE	16
95	TEMPLE UNIVERSITY	16
96	HAWAII, UNIVERSITY OF	15
97	NEW SCHOOL FOR SOCIAL RESEARCH	15
98	EMORY UNIVERSITY	14
99	LOUISVILLE, UNIVERSITY OF	13
100	NEW HAMPSHIRE, UNIVERSITY OF	13
101	LAWRENCE UNIVERSITY	13
102	ARKANSAS, UNIVERSITY OF	13
103	CLAREMONT GRADUATE SCHOOL AND UNIVERSITY CENTER	12
104	MIAMI, UNIVERSITY OF	11
105	CLARK UNIVERSITY	11
106	NEW MEXICO STATE UNIVERSITY	11
107	ST. JOHN'S UNIVERSITY	11
108	RHODE ISLAND, UNIVERSITY OF	11
109	TUFTS UNIVERSITY	10
110	BAYLOR UNIVERSITY	10
111	MONTANA STATE COLLEGE	9
112	BRYN MAWR COLLEGE	9
113	HOUSTON, UNIVERSITY OF	9
114	LOYOLA UNIVERSITY	8
115	MISSISSIPPI, UNIVERSITY OF	8
116	YESHIVA UNIVERSITY	8
117	PORTLAND, UNIVERSITY OF	8
118	JEFFERSON MEDICAL COLLEGE	8
119	SOUTH DAKOTA STATE COLLEGE OF AGRICULTURE AND MECHANIC ARTS	8
120	GEORGE PEABODY COLLEGE FOR TEACHERS	8
121	WEST VIRGINIA UNIVERSITY	8
122	WYOMING, UNIVERSITY OF	8
123	HOWARD UNIVERSITY	7
124	SOUTHERN ILLINOIS UNIVERSITY	6
125	AKRON, THE UNIVERSITY OF	6
126	THE CLEMSON AGRICULTURAL COLLEGE	6
127	VIRGINIA, MEDICAL COLLEGE OF	6
128	AUBURN UNIVERSITY	6
129	CALIFORNIA, UNIVERSITY OF - SAN DIEGO	5
130	MISSISSIPPI STATE UNIVERSITY	5
131	ALFRED UNIVERSITY	5
132	DENVER, UNIVERSITY OF	4
133	ADELPHI UNIVERSITY	4
134	UNION COLLEGE AND UNIVERSITY	4
135	STATE UNIVERSITY OF NEW YORK - DOWNSTATE MEDICAL CENTER	4
136	TEXAS TECHNOLOGICAL COLLEGE	4
137	BRIGHAM YOUNG UNIVERSITY	4
138	ARIZONA STATE UNIVERSITY	4
139	MONTANA, UNIVERSITY OF	3
140	STATE UNIVERSITY OF NEW YORK - UPSTATE MEDICAL CENTER	3
141	DUQUESNE UNIVERSITY	3
142	ALASKA, UNIVERSITY OF	3
143	CALIFORNIA, UNIVERSITY OF - RIVERSIDE	2
144	WORCESTER POLYTECHNIC INSTITUTE	2
145	NORTH DAKOTA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	2
146	HAHNEMANN MEDICAL COLLEGE	2
147	PHILADELPHIA COLLEGE OF PHARMACY AND SCIENCE	2
148	SOUTH CAROLINA, MEDICAL COLLEGE OF	2
149	VERMONT, UNIVERSITY OF	2
150	COLORADO SCHOOL OF MINES	1
151	MAINE, UNIVERSITY OF	1
152	LOWELL TECHNOLOGICAL INSTITUTE	1
153	SOUTHERN MISSISSIPPI, UNIVERSITY OF	1
154	NEW MEXICO INSTITUTE OF MINING AND TECHNOLOGY	1
155	ST. BONAVENTURE UNIVERSITY	1
156	NORTH DAKOTA, UNIVERSITY OF	1
157	OHIO UNIVERSITY	1
158	SOUTH CAROLINA, UNIVERSITY OF	1
159	SOUTHERN METHODIST UNIVERSITY	1

TABLE B-8
ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY MASTER'S DEGREES IN SCIENCE AND ENGINEERING
ACADEMIC YEAR 1962-1963

RANK	INSTITUTION	DEGREES	RANK	INSTITUTION	DEGREES
1	ILLINOIS, UNIVERSITY OF	774	51	NEBRASKA, UNIVERSITY OF	144
2	MICHIGAN, THE UNIVERSITY OF	759	52	ARKANSAS, UNIVERSITY OF	143
3	NEW YORK UNIVERSITY	722	53	PRINCETON UNIVERSITY	140
4	PURDUE UNIVERSITY	671	54	CONNECTICUT, UNIVERSITY OF	139
5	CALIFORNIA, UNIVERSITY OF -BERKELEY	666	55	SOUTHERN METHODIST UNIVERSITY	139
6	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	616	56	CARNEGIE INSTITUTE OF TECHNOLOGY	138
7	STANFORD UNIVERSITY	599	57	MARYLAND, UNIVERSITY OF	137
8	COLUMBIA UNIVERSITY	569	58	GEORGIA INSTITUTE OF TECHNOLOGY	136
9	WISCONSIN, UNIVERSITY OF	530	59	VIRGINIA POLYTECHNIC INSTITUTE	136
10	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	394	60	FORDHAM UNIVERSITY	128
11	MICHIGAN STATE UNIVERSITY	385	61	CALIFORNIA INSTITUE OF TECHNOLOGY	127
12	MISSOURI, UNIVERSITY OF	357	62	PITTSBURGH, UNIVERSITY OF	127
13	THE OHIO STATE UNIVERSITY	350	63	ARIZONA STATE UNIVERSITY	127
14	SOUTHERN CALIFORNIA, UNIVERSITY OF	342	64	BOSTON UNIVERSITY	124
15	MINNESOTA, UNIVERSITY OF	335	65	THE CATHOLIC UNIVERSITY OF AMERICA	120
16	WASHINGTON, UNIVERSITY OF	313	66	WASHINGTON UNIVERSITY	120
17	PENNSYLVANIA, UNIVERSITY OF	294	67	WEST VIRGINIA UNIVERSITY	119
18	THE PENNSYLVANIA STATE UNIVERSITY	289	68	GEORGIA, THE UNIVERSITY OF	118
19	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	284	69	HAWAII, UNIVERSITY OF	118
20	CORNELL UNIVERSITY	277	70	NEW MEXICO, THE UNIVERSITY OF	118
21	HARVARD UNIVERSITY	273	71	MASSACHUSETTS, UNIVERSITY OF	117
22	CHICAGO, THE UNIVERSITY OF	267	72	SAINT LOUIS UNIVERSITY	115
23	RENSSELAER POLYTECHNIC INSTITUTE	241	73	CALIFORNIA, UNIVERSITY OF - DAVIS	111
24	KANSAS STATE UNIVERSITY	234	74	OREGON, UNIVERSITY OF	11[illegible]
25	YALE UNIVERSITY	231	75	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	109
26	RUTGERS -- THE STATE UNIVERSITY	228	76	WYOMING, UNIVERSITY OF	106
27	POLYTECHNIC INSTITUTE OF BROOKLYN	221	77	NEWARK COLLEGE OF ENGINEERING	105
28	TEXAS, UNIVERSITY OF	216	78	CINCINNATI, UNIVERSITY OF	105
29	COLORADO, UNIVERSITY OF	211	79	NEW HAMPSHIRE, UNIVERSITY OF	102
30	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	210	80	LEHIGH UNIVERSITY	102
31	TENNESSEE, UNIVERSITY OF	210	81	CASE INSTITUTE OF TECHNOLOGY	101
32	STEVENS INSTITUTE OF TECHNOLOGY	208	82	ILLINOIS INSTITUTE OF TECHNOLOGY	100
33	OKLAHOMA, UNIVERSITY OF	206	83	MISSISSIPPI STATE UNIVERSITY	100
34	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	204	84	ROCHESTER, UNIVERSITY OF	100
35	THE CITY UNIVERSITY OF NEW YORK - THE CITY COLLEGE	201	85	ADELPHI UNIVERSITY	99
36	NORTHEASTERN UNIVERSITY	198	86	UTAH, UNIVERSITY OF	99
37	NORTHWESTERN UNIVERSITY	195	87	VIRGINIA, UNIVERSITY OF	98
38	SYRACUSE UNIVERSITY	192	88	KENTUCKY, UNIVERSITY OF	97
39	OREGON STATE UNIVERSITY	192	89	UTAH STATE UNIVERSITY	97
40	IOWA, UNIVERSITY OF	188	90	WASHINGTON STATE UNIVERSITY	95
41	FLORIDA, UNIVERSITY OF	187	91	COLORADO STATE UNIVERSITY	94
42	DREXEL INSTITUTE OF TECHNOLOGY	185	92	IDAHO, UNIVERSITY OF	93
43	ARIZONA, THE UNIVERSITY OF	184	93	SAN JOSE STATE COLLEGE	90
44	KANSAS, UNIVERSITY OF	178	94	DETROIT, UNIVERSITY OF	90
45	WAYNE STATE UNIVERSITY	178	95	TEMPLE UNIVERSITY	90
46	NOTRE DAME, UNIVERSITY OF	176	96	SOUTHERN ILLINOIS UNIVERSITY	88
47	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	175	97	AUBURN UNIVERSITY	88
48	TEXAS AGRICULTURAL AND MECHANICAL UNIVERSITY	170	98	MISSISSIPPI, UNIVERSITY OF	87
49	GEORGE WASHINGTON UNIVERSITY	163	99	DELAWARE, UNIVERSITY OF	84
50	INDIANA UNIVERSITY	152	100	VILLANOVA UNIVERSITY	83

TABLE B-9
ACCREDITED DEGREE GRANTING EDUCATIONAL INSTITUTIONS RANK ORDERED BY BACHELOR'S DEGREES IN SCIENCE AND ENGINEERING
ACADEMIC YEAR 1962-1963

RANK	INSTITUTION	DEGREES	RANK	INSTITUTION	DEGREES
1	CALIFORNIA, UNIVERSITY OF -BERKELEY	1757	51	GEORGIA, THE UNIVERSITY OF	527
2	ILLINOIS, UNIVERSITY OF	1611	52	CINCINNATI, UNIVERSITY OF	518
3	PURDUE UNIVERSITY	1555	53	NORTHEASTERN UNIVERSITY	517
4	MINNESOTA, UNIVERSITY OF	1470	54	SYRACUSE UNIVERSITY	509
5	WISCONSIN, UNIVERSITY OF	1459	55	KANSAS STATE UNIVERSITY	509
6	THE PENNSYLVANIA STATE UNIVERSITY	1441	56	PENNSYLVANIA, UNIVERSITY OF	508
7	MICHIGAN, THE UNIVERSITY OF	1436	57	AUBURN UNIVERSITY	508
8	THE CITY UNIVERSITY OF NEW YORK - THE CITY COLLEGE	1416	58	CALIFORNIA STATE COLLEGE AT LOS ANGELES	506
9	MISSOURI, UNIVERSITY OF	1301	59	NEBRASKA, UNIVERSITY OF	502
10	CALIFORNIA, UNIVERSITY OF - LOS ANGELES	1131	60	BRIGHAM YOUNG UNIVERSITY	493
11	TEXAS, UNIVERSITY OF	1078	61	OKLAHOMA, UNIVERSITY OF	491
12	WASHINGTON, UNIVERSITY OF	1052	62	ILLINOIS INSTITUTE OF TECHNOLOGY	480
13	THE OHIO STATE UNIVERSITY	1032	63	BOSTON UNIVERSITY	479
14	MICHIGAN STATE UNIVERSITY	1030	64	ARIZONA, THE UNIVERSITY OF	478
15	THE CITY UNIVERSITY OF NEW YORK - BROOKLYN COLLEGE	995	65	WASHINGTON STATE UNIVERSITY	476
16	CORNELL UNIVERSITY	942	66	SOUTHERN ILLINOIS UNIVERSITY	468
17	RUTGERS -- THE STATE UNIVERSITY	924	67	MARQUETTE UNIVERSITY	464
18	IOWA STATE UNIVERSITY OF SCIENCE AND TECHNOLOGY	862	68	INDIANA UNIVERSITY	462
19	NORTH CAROLINA STATE OF THE UNIVERSITY OF NORTH CAROLINA AT RALEIGH	858	69	ALABAMA, UNIVERSITY OF	461
20	NEW YORK UNIVERSITY	828	70	YALE UNIVERSITY	460
21	FLORIDA, UNIVERSITY OF	821	71	KANSAS, UNIVERSITY OF	458
22	STANFORD UNIVERSITY	817	72	NEWARK COLLEGE OF ENGINEERING	447
23	OKLAHOMA STATE UNIVERSITY OF AGRICULTURE AND APPLIED SCIENCE	813	73	COLORADO STATE UNIVERSITY	447
24	THE CITY UNIVERSITY OF NEW YORK - HUNTER COLLEGE	777	74	MICHIGAN TECHNOLOGICAL UNIVERSITY	446
25	HARVARD UNIVERSITY	770	75	MIAMI, UNIVERSITY OF	435
26	VIRGINIA POLYTECHNIC INSTITUTE	741	76	WEST VIRGINIA UNIVERSITY	432
27	MASSACHUSETTS INSTITUTE OF TECHNOLOGY	739	77	KENTUCKY, UNIVERSITY OF	423
28	CALIFORNIA STATE POLYTECHNIC COLLEGE	709	78	POLYTECHNIC INSTITUTE OF BROOKLYN	421
29	COLUMBIA UNIVERSITY	698	79	MANHATTAN COLLEGE	421
30	COLORADO, UNIVERSITY OF	672	80	NORTH CAROLINA, UNIVERSITY OF AT CHAPEL HILL	421
31	TEXAS AGRICULTURAL AND MECHANICAL UNIVERSITY	661	81	OHIO UNIVERSITY	420
32	MARYLAND, UNIVERSITY OF	658	82	MISSISSIPPI STATE UNIVERSITY	419
33	PUERTO RICO, UNIVERSITY OF	633	83	SAN DIEGO STATE COLLEGE	419
34	OREGON STATE UNIVERSITY	618	84	DETROIT, UNIVERSITY OF	410
35	TENNESSEE, UNIVERSITY OF	617	85	DARTMOUTH COLLEGE	405
36	GEORGIA INSTITUTE OF TECHNOLOGY	614	86	VIRGINIA, UNIVERSITY OF	404
37	NOTRE DAME, UNIVERSITY OF	614	87	MAINE, UNIVERSITY OF	402
38	LOUISIANA STATE UNIVERSITY AND AGRICULTURAL AND MECHANICAL COLLEGE	599	88	BOSTON COLLEGE	401
39	SAN JOSE STATE COLLEGE	596	89	THE CITY UNIVERSITY OF NEW YORK - QUEENS COLLEGE	394
40	UTAH, UNIVERSITY OF	595	90	UTAH STATE UNIVERSITY	394
41	PITTSBURGH, UNIVERSITY OF	583	91	ARKANSAS, UNIVERSITY OF	390
42	DREXEL INSTITUTE OF TECHNOLOGY	583	92	TUFTS UNIVERSITY	380
43	TEXAS TECHNOLOGICAL COLLEGE	582	93	DUKE UNIVERSITY	378
44	MASSACHUSETTS, UNIVERSITY OF	566	94	SOUTHERN CALIFORNIA, UNIVERSITY OF	377
45	RENSSELAER POLYTECHNIC INSTITUTE	564	95	STATE UNIVERSITY OF NEW YORK - BUFFALO	376
46	IOWA, UNIVERSITY OF	548	96	LEHIGH UNIVERSITY	364
47	CONNECTICUT, UNIVERSITY OF	544	97	JOHNS HOPKINS UNIVERSITY	354
48	WAYNE STATE UNIVERSITY	543	98	PRINCETON UNIVERSITY	352
49	FAIRLEIGH DICKINSON UNIVERSITY	541	99	WASHINGTON UNIVERSITY	342
50	NORTHWESTERN UNIVERSITY	528	100	CARNEGIE INSTITUTE OF TECHNOLOGY	341

Table C-1.—*Manpower Dynamics of Degree-Granting Accredited Universities and Colleges by Institution Class In Academic Year 1962–1963*

		Enrollment			Science and Technology							
		Total	Graduate	R_e[1]	S&T DP	BA	MA	PhD	DVM	MD	DDS	R_s[2]
Grand Total	1,063	3,425,456	369,964	*0.108*	277,149	132,436	26,761	7,963	823	6,873	3,181	*0.081*
Class A Total	169	1,701,687	263,699	*.155*	206,533	71,528	22,902	7,963	814	6,873	3,181	*.121*
Denominational	24	157,928	22,016	*.139*	16,006	5,175	1,293	257		885	724	*.101*
Private	52	413,830	97,627	*.236*	63,598	17,672	7,675	3,015	98	2,310	924	*.154*
Public	93	1,129,929	144,056	*.127*	126,929	48,681	13,934	4,691	716	3,678	1,533	*.112*
Class B Total	197	875,843	81,372	*.093*	38,967	29,259	3,859	0	9	0	0	*.044*
Denominational	40	115,010	11,991	*.104*	5,812	4,594	483	0	0	0	0	*.051*
Private	43	129,631	13,158	*.102*	8,966	6,440	999	0	9	0	0	*.069*
Public	114	631,202	56,223	*.089*	24,189	18,225	2,377	0	0	0	0	*.038*
Class C Total	651	804,718	22,060	*.027*	31,649	31,649	0	0	0	0	0	*.039*
Denominational	404	381,602	5,157	*.014*	17,266	17,266	0	0	0	0	0	*.045*
Private	121	156,331	3,749	*.024*	7,431	7,431	0	0	0	0	0	*.048*
Public	126	266,785	13,154	*.049*	6,952	6,952	0	0	0	0	0	*.026*
Class D Total	46	43,208	2,833	*.066*	0	0	0	0	0	0	0	*0*
Denominational	12	5,425	48	*.009*	0	0	0	0	0	0	0	*0*
Private	13	8,576	514	*.060*	0	0	0	0	0	0	0	*0*
Public	21	29,207	2,271	*.078*	0	0	0	0	0	0	0	*0*

[1] R_e = Graduate student enrollment/total enrollment.
[2] R_s = Science and technology degree productivity/total enrollment.

Table C-2.—Manpower Dynamics of Degree-Granting Accredited Universities and Colleges by Institution Class in Academic Year 1962–1963

[Percent][1]

	Enrollment		Science and Technology						
	Total	Graduate	S&T DP[2]	BA	MA	PhD	DVM	MD	DDS
Grand Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Class A Total	49.7	71.3	74.5	54.0	85.6	100.0	98.9	100.0	100.0
Denominational	4.6	6.0	3.6	3.9	4.8	3.2	0	12.9	22.8
Private	12.1	26.4	22.9	13.3	28.7	37.9	11.9	33.6	29.0
Public	33.0	38.9	45.8	36.8	52.1	58.9	87.0	53.5	48.2
Class B Total	25.6	22.0	14.1	22.1	14.4	0	1.1	0	0
Denominational	3.4	3.2	2.1	3.5	1.8	0	0	0	0
Private	3.8	3.6	3.2	4.9	3.7	0	1.1	0	0
Public	18.4	15.2	8.7	13.8	8.9	0	0	0	0
Class C Total	23.5	6.0	11.4	23.9	0	0	0	0	0
Denominational	11.1	1.4	6.2	13.1	0	0	0	0	0
Private	4.6	1.0	2.7	5.6	0	0	0	0	0
Public	7.8	3.6	2.5	5.2	0	0	0	0	0
Class D Total	1.2	0.8	0	0	0	0	0	0	0
Denominational	0.1	—	0	0	0	0	0	0	0
Private	0.2	0.1	0	0	0	0	0	0	0
Public	0.9	0.6	0	0	0	0	0	0	0

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[1] Percent detail may not add to 100 because of rounding.

[2] S&T DP = Science and Technology Degree Productivity.

Table C–3.—*Federal Agency Obligations for Academic Science by Class and Control of Academic Institutions*

[Dollars in thousands]

	FFAS	DOD	NASA	AEC	USPHS	NSF	USOE	USDA	Other
					CLASS				
Total	$1,099,481	$199,400	$42,122	$62,244	$499,527	$227,323	$19,680	$41,697	$7,488
Percent[1]	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*
Class A	1,045,622	192,616	41,542	61,268	488,097	195,828	18,120	40,901	7,250
Percent[1]	*95.1*	*96.6*	*98.6*	*98.4*	*97.7*	*86.1*	*92.1*	*98.1*	*96.8*
Class B	37,359	5,833	428	730	8,062	19,982	1,324	796	204
Percent[1]	*3.4*	*2.9*	*1.0*	*1.2*	*1.6*	*8.8*	*6.7*	*1.9*	*2.7*
Class C	16,306	909	152	246	3,325	11,449	191	—	34
Percent[1]	*1.5*	*0.5*	*0.4*	*0.4*	*0.7*	*5.1*	*1.0*	*0*	*0.5*
Class D	194	42	—	—	43	64	45	—	—
Percent[1]	—	—	*0*	*0*	—	—	*0.2*	*0*	*0*
					CONTROL				
Denominational	67,148	9,636	1,524	1,068	41,180	12,909	778	—	53
Percent[1]	*6.1*	*4.8*	*3.6*	*1.7*	*8.3*	*5.7*	*4.0*	*0*	*0.7*
Private	484,848	110,577	20,783	29,834	222,446	91,238	6,574	963	2,433
Percent[1]	*44.1*	*55.5*	*49.3*	*47.9*	*44.5*	*40.1*	*33.4*	*2.3*	*32.5*
Public	547,485	79,187	19,815	31,342	235,901	123,176	12,328	40,734	5,002
Percent[1]	*49.8*	*39.7*	*47.1*	*50.4*	*47.2*	*54.2*	*62.6*	*97.7*	*66.8*

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[1] Percent detail may not add to 100 because of rounding.

Table C–4.—Comparison of Federal Funds for Academic Science Data to Data Reported in Federal Funds for Research, Development and Other Scientific Activities for Fiscal Year 1963

[Dollars in thousands]

Federal Agencies	Federal Funds for Academic Science	Federal Funds for Research and Development at Educational Institutions Proper
Total	$1,099,481	$851,094
Department of Defense	199,400	210,203
National Aeronautics and Space Administration	42,122	78,170
Atomic Energy Commission	62,244	57,724
U.S. Public Health Service	499,527	350,355
National Science Foundation	227,323	107,509
U.S. Office of Education	19,680	—
U.S. Department of Agriculture	41,697	40,586
U.S. Department of Interior	—	3,767
U.S. Department of Commerce	—	2,780
Other	7,488[1]	—

[1] Department of Interior and Commerce funds are included in this value for "Other."

Table C–5.—Manpower Resources of Universities and Colleges Ordered by Level of Federal Funds for Academic Science, Fiscal Year 1963

[Dollars in thousands]

Level of Federal Funds for Academic Science Received by Institutions	Number of Institutions	Federal Funds for Academic Science	Educational & General Income	Enrollment			Science and Technology							
				Total	Graduate Student	R_e[2]	Degree Production[3]	BA	MA	PhD	DVM	MD	DDS	R_s[4]
Above $20,000	14	$ 394,143	$ 715,955	295,988	65,291	*0.221*	49,992	13,902	6,351	2,886	175	1,240	450	*0.169*
Average		28,153	51,140	21,142	4,664		3,566	993	454	206	13	89	32	
Percent[1]	*1.3*	*35.8*	*16.5*	*8.6*	*17.6*		*18.0*	*10.5*	*23.7*	*36.2*	*21.3*	*18.0*	*14.1*	
$10,000–$20,000	15	208,676	481,073	234,515	46,427	*0.198*	31,377	8,757	3,136	1,474	69	1,267	731	*0.134*
Average		13,912	32,072	15,634	3,095		2,092	584	209	98	5	85	49	
Percent[1]	*1.4*	*19.0*	*11.0*	*6.9*	*12.6*		*11.3*	*6.6*	*11.7*	*18.6*	*8.3*	*18.5*	*23.0*	
$5,000–$10,000	31	223,082	701,513	440,124	64,412	*0.146*	49,620	17,203	5,373	1,879	164	1,811	728	*0.113*
Average		7,196	22,629	14,198	2,078		1,601	555	173	61	5	58	23	
Percent[1]	*2.9*	*20.3*	*16.2*	*12.9*	*17.4*		*17.9*	*13.0*	*20.1*	*23.5*	*20.0*	*26.3*	*22.9*	
$500–$5,000	106	233,293	1,011,939	772,525	92,052	*0.119*	78,176	33,799	8,618	1,639	406	2,555	1,115	*0.102*
Average		2,201	9,547	7,288	868		738	319	81	15	4	24	11	
Percent[1]	*10.0*	*21.2*	*23.3*	*22.6*	*24.9*		*28.2*	*25.5*	*32.2*	*20.6*	*49.3*	*37.2*	*35.1*	
$100–$500	129	28,881	506,162	589,829	54,425	*0.092*	28,239	21,672	2,250	61	9	0	157	*0.048*
Average		224	3,924	4,572	422		219	168	17	—	—	0	1	
Percent[1]	*12.1*	*2.6*	*11.6*	*17.2*	*14.7*		*10.2*	*16.4*	*8.4*	*0.8*	*1.1*	*0*	*4.9*	
$1–$100	416	11,406	631,668	738,401	35,801	*0.048*	29,484	26,969	956	24	0	0	0	*0.040*
Average		27	1,518	1,775	86		71	65	2	—	0	0	0	
Percent[1]	*39.2*	*1.1*	*14.5*	*21.5*	*9.7*		*10.6*	*20.3*	*3.6*	*0.3*	*0*	*0*	*0*	
No Federal Funds	352	0	298,083	354,074	11,556	*0.033*	10,331	10,134	77	0	0	0	0	*0.029*
Average		0	847	1,006	33		29	29	—	0	0	0	0	
Percent[1]	*33.1*	0	*6.9*	*10.4*	*3.1*		*3.8*	*7.7*	*0.3*	*0*	*0*	*0*	*0*	
Total	1,063	$1,099,481	$4,346,393	3,425,456	369,964	*0.108*	277,149	132,436	26,761	7,963	823	6,873	3,181	*0.081*
Average		1,034	4,089	3,222	348		261	125	25	7	1	6	3	
Percent[1]	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*		*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	

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[1] Percent detail may not add to 100 because of rounding.

[2] R_e = Graduate student enrollment/total enrollment.

[3] Degree Produ. [illegible] in S&T DP units.

[4] R_s = Science and technology degree productivity/total enrollment.

Table C–6.—Influence of Federal Funds on Academic Science by Agency

Institutions Rank Ordered by FFAS	FFAS (dollars in thousands)	Number of Institutions Receiving Principal Support From:						
		DOD	NASA	AEC	USPHS	NSF	USOE	USDA
First 50	$6,258–$42,530	5			40	4		1
Second 50	2,718– 6,184	6	1		31	8		4
Third 50	798– 2,663	9			18	15		8
Total: First 150	798– 42,530	20	1		89	27		13
Fourth 50	298– 796	3	1	1	7	36	1	1
Fifth 50	151– 295	3			9	37	1	
Sixth 50	95– 148			1	4	44	1	
Seventh 50	58– 94	1			5	43	1	
Eighth 50	42– 57	1		1	11	36	1	
Ninth 50	27– 42	1		1	20	27	1	
Tenth 50	18– 27	1			3	46		
Total: 150–500	18– 796	10	1	4	59	269	6	1

Table C–7.—Profile of Degree-Accredited Institutions Receiving Federal Support for Academic Science by Agency

	Institutions Supported		
		Percent of	
	Number	Study Population	Those Supported
Total	711	67.0	
DOD	185	17.4	26.0
NASA	121	11.4	17.0
AEC	168	15.8	23.6
USPHS	398	37.4	56.0
NSF	648	60.9	91.1
USOE	186	17.5	26.2
USDA	57	5.4	8.0
Other	91	8.6	12.8

Table C–8.—Relationship Between the Academic Budget of Universities and Colleges and Federal Funds for Academic Science

[Dollars in thousands]

	Number Institutions	Total		R_{fe}[3]	Average	
		EGI[1]	FFAS[2]		EGI	FFAS
Total	1,063	$4,346,393	$1,099,481	0.202	$ 4,089	$ 1,034
By Level of Educational and General Income (EGI):						
Above $40 Million	19	1,040,195	391,511	0.273	54,747	20,606
$20 Million–$40 Million	28	750,107	243,026	0.245	26,790	8,680
$10 Million–$20 Million	52	762,914	253,295	0.249	14,671	4,871
$ 5 Million–$10 Million	80	576,754	144,899	0.201	7,209	1,811
$ 1 Million–$ 5 Million	469	969,998	62,221	0.060	2,068	133
Under $1 Million	415	246,425	4,529	0.018	594	11
By Level of Federal Funds for Academic Science (FFAS):						
Above $20 Million	14	715,955	394,143	0.355	51,140	28,153
$10 Million–$20 Million	15	481,073	208,676	0.303	32,070	13,912
$ 5 Million–$10 Million	31	701,503	223,082	0.241	22,629	7,196
$0.5 Million–$ 5 Million	106	1,011,939	233,293	0.187	9,547	2,201
$100,000–$500,000	129	506,162	28,881	0.054	3,924	224
$1,000–$100,000	416	631,668	11,406	0.018	1,518	27
No FFAS	352	298,083	0	0	847	0

[1] EGI = Educational and General Income.

[2] FFAS = Federal Funds for Academic Science.

[3] $R_{fe} = \frac{FFAS}{EGI + FFAS}$

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Table C–9.—*Manpower Dynamics in Higher Education and the Total Research and Education Budgets of Universities and Colleges*

[Dollars in thousands]

	Number Institutions	Institutional Income[1]		R_e[2]	AVERAGE/INSTITUTION			
					Enrollment			
		Total	Average		Total	Graduate	S&T DP[3]	R_s[4]
Total	1,063	$5,445,874	$ 5,123	0.108	3,222	348	261	0.081
By Level of Educational and General Income (EGI):								
Above $40 Million	19	1,431,706	75,353	0.205	23,492	4,821	3,521	0.150
$20 Million–$40 Million	28	993,133	35,469	0.148	16,179	2,389	1,760	0.109
$10 Million–$20 Million	52	1,016,209	19,542	0.126	11,515	1,447	1,046	0.091
$ 5 Million–$10 Million	80	721,653	9,021	0.121	6,814	827	555	0.081
$ 1 Million–$ 5 Million	469	1,032,219	2,201	0.059	2,328	138	110	0.047
Under $1 Million	415	250,954	605	0.018	700	12	26	0.037
By Level of Federal Funds for Academic Science (FFAS):								
Above $20 Million	14	1,110,098	79,293	0.221	21,142	4,664	3,566	0.169
$10 Million–$20 Million	15	689,749	45,983	0.198	15,634	3,095	2,092	0.134
$ 5 Million–$10 Million	31	924,585	29,825	0.146	14,198	2,078	1,601	0.113
$0.5 Million–$ 5 Million	106	1,245,232	11,747	0.119	7,288	868	738	0.101
$100,000–$500,000	129	535,043	4,148	0.092	4,572	422	219	0.048
$1,000–$100,000	416	643,074	1,546	0.048	1,775	86	71	0.040
No FFAS	352	298,083	847	0.033	1,006	33	29	0.029

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[1] Institutional Income = Educational and general income + Federal funds for academic science.

[2] R_e = Graduate enrollment/total enrollment.

[3] S&T DP = Science and Technology Degree Productivity units.

[4] R_s = S&T DP/total enrollment.

Table C–10.—*Academic Institutions Receiving in Excess of Forty Percent of Total Income From Federal Funds for Academic Science*

	FFAS Rank Order	Control	Class	R_{fe}[2]	R_e[3]	R_s[4]
Columbia University	1	Private	A–M [1]	0.483	0.354	0.152
Massachusetts Institute of Technology	2	Private	A	.687	.394	.523
Stanford University	6	Private	A–M	.400	.322	.317
University of Chicago	8	Private	A–M	.524	.347	.240
Johns Hopkins University	10	Private	A–M	.614	.190	.143
Washington University	23	Private	A–M	.417	.143	.094
Duke University	24	Private	A–M	.414	.158	.193
University of California at San Diego	27	Public	A	.629	1.000	.210
Western Reserve University	30	Private	A–M	.433	.323	.129
Yeshiva University	32	Denom.	A–M	.580	.213	.175
California Institute of Technology	33	Private	A	.520	.481	.639
Baylor University	46	Denom.	A–M	.609	.087	.175
University of Oklahoma	47	Public	A–M	.407	.137	.114
Emory University	61	Denom.	A–M	.405	.120	.207
Carnegie Institute of Technology	63	Private	A	.401	.177	.202
Polytechnic Institute of Brooklyn	70	Private	A	.450	.494	.221
Case Institute of Technology	75	Private	A	.414	.356	.281
Stevens Institute of Technology	109	Private	A	.423	.432	.347
Hahnemann Medical College	111	Private	A–M	.506	.180	.782
Union College and University	115	Private	A–M	.425	.113	.204
Georgia Medical College	125	Public	A–M	.434	.193	.792
South Carolina Medical College	135	Public	A–M	.416	.186	.775

[1] M = Medical Education Associated.
[2] R_{fe} = Federal funds impact index.
[3] R_e = Graduate education index.
[4] R_s = Science education index.

Table C–11.—Comparison of Recipient Institutions to Nonrecipients of Federal Funds for Academic Science

[Dollars in thousands]

					Enrollment			Science and Technology							
	Count	EGI[1]	FFAS[2]	R_{fe}[3]	Total	Graduate	R_e[4]	S&T DP	BA	MA	PhD	DVM	MD	DDS	R_s[5]
BY CLASS															
All Institutions	1,063	$4,346,393	$1,099,481	0.202	3,425,456	369,964	0.108	277,149	132,436	26,761	7,963	823	6,873	3,181	0.081
Recipients	711	4,048,310	1,099,481	.214	3,071,382	358,408	.117	266,818	122,302	26,684	7,963	823	6,873	3,181	.087
Nonrecipients	352	298,083	0	.000	354,074	11,556	.033	10,331	10,134	77	0	0	0	0	.029
Class A	169	2,864,882	1,045,622	.267	1,701,687	263,699	.155	206,533	71,528	22,902	7,963	814	6,873	3,181	.121
Recipients	169	2,864,882	1,045,622	.267	1,701,687	263,699	.155	206,533	71,528	22,902	7,963	814	6,873	3,181	.121
Nonrecipients	0														
Class B	197	725,791	37,359	.049	875,843	81,372	.093	38,967	29,259	3,859	0	9	0	0	.044
Recipients	179	692,856	37,359	.051	836,165	78,601	.094	37,937	28,426	3,782	0	9	0	0	.045
Nonrecipients	18	32,935	0	.000	39,678	2,771	.070	1,030	833	77	0	0	0	0	.026
Class C	651	714,038	16,306	.022	804,718	22,060	.027	31,649	31,649	0	0	0	0	0	.039
Recipients	355	484,156	16,306	.033	526,876	15,472	.029	22,348	22,348	0	0	0	0	0	.042
Nonrecipients	296	229,882	0	.000	277,842	6,588	.024	9,301	9,301	0	0	0	0	0	.033
Class D	46	41,682	194	.005	43,208	2,833	.066	0	0	0	0	0	0	0	.000
Recipients	8	6,416	194	.029	6,654	636	.096	0	0	0	0	0	0	0	.000
Nonrecipients	38	35,266	0	.000	36,554	2,197	.060	0	0	0	0	0	0	0	.000
BY CONTROL															
Denominational	480	618,519	67,148	0.098	659,965	39,212	0.059	39,084	27,035	1,776	257	0	885	724	0.059
Recipients	273	485,515	67,148	.121	506,942	37,360	.074	33,206	21,176	1,769	257	0	885	724	.066
Nonrecipients	207	133,004	0	.000	153,023	1,852	.012	5,878	5,859	7	0	0	0	0	.038
Private	229	1,189,532	484,848	.290	708,368	115,048	.162	79,995	31,543	8,674	3,015	107	2,310	924	.113
Recipients	180	1,149,278	484,848	.297	669,482	114,194	.171	78,607	30,210	8,652	3,015	107	2,310	924	.117
Nonrecipients	49	40,254	0	.000	38,886	854	.022	1,388	1,333	22	0	0	0	0	.036
Public	354	2,538,342	547,485	.177	2,057,123	215,704	.105	158,070	73,858	16,311	4,691	716	3,678	1,533	.077
Recipients	258	2,413,517	547,485	.185	1,894,958	206,854	.109	155,005	70,916	16,263	4,691	716	3,678	1,533	.082
Nonrecipients	96	124,825	0	.000	162,165	8,850	.055	3,065	2,942	48	0	0	0	0	.019

[1] EGI = Educational and General Income.

[2] FFAS = Federal Funds for Academic Science.

[3] R_{fe} = FFAS/EGI + FFAS.

[4] R_e = Graduate enrollment/total enrollment.

[5] R_s = S&T DP/total enrollment.

Table C–12.—Manpower and Funding Characteristics of Universities and Colleges Enrolling Predominantly Negro Students

[Dollars in thousands]

Funding Characteristics

	Number Institutions	FFAS[1]	EGI[2]	DOD	NASA	AEC	USPHS	NSF	USOE	USDA	Other	R_{fe}[3]
Total Institutions	1,063	$1,099,481	$4,346,393	$199,400	$42,122	$62,244	$499,527	$227,323	$19,680	$41,697	$7,488	*0.202*
Average		1,034	4,089	188	40	59	470	214	19	39	7	
Percent[8]	*100.0*	*100.0*	—	*18.1*	*3.8*	*5.7*	*45.4*	*20.7*	*1.8*	*3.8*	*0.7*	
Predominantly Negro												
Institutions	69	5,274	90,351	103	0	59	1,785	3,087	187	0	53	*0.055*
Average		76	1,309	1	0	1	26	45	3	0	1	
Percent[8]	*6.5*	*100.0*	—	*2.0*	0	*1.1*	*33.8*	*58.6*	*3.5*	*0*	*1.0*	

Manpower Dynamics

				Enrollment			Science and Technology							
				Total	Graduate	R_e[4]	S&T DP[5]	BA	MA	PhD	DVM	MD[6]	DDS	R_s[7]
Total Institutions	1,063	$1,099,481	$4,346,393	3,425,456	369,964	*0.108*	277,149	132,436	26,761	7,963	823	6,873	3,181	*0.081*
Average		1,034	4,089	3,222	348		261	125	25	7	1	6	3	
Percent[8]	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*		*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	
Predominantly Negro														
Institutions	69	5,274	90,351	93,958	4,586	*0.049*	4,070	2,954	161	7	9	95	70	*0.043*
Average		76	1,309	1,362	66		59	43	2	—	—	1	1	
Percent[8]	*6.5*	*0.5*	*2.1*	*2.7*	*1.2*		*1.5*	*2.2*	*0.6*	*0.1*	*1.1*	*1.4*	*2.2*	
Recipients of FFAS	39	5,274	69,332	68,980	4,541	*0.066*	3,479	2,363	161	7	9	95	70	*0.050*
Nonrecipients of FFAS	30	0	21,019	24,978	45	0.002	591	591	0	0	0	0	0	0.024

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[1] FFAS = Federal Funds for Academic Science.

[2] EGI = Educational and General Income.

[3] R_{fe} = FFAS/EGI + FFAS

[4] R_e = Graduate enrollment/total enrollment.

[5] S&T DP = Science and Technology Degree Productivity

[6] Meharry Medical College not in study population.

[7] R_s = S&T DP/total enrollment.

[8] Percent detail may not add to 100 because of rounding.

Table C–13.—Comparison of Manpower and Funding Characteristics of Medical Education and Nonmedical Education Engaged Universities

[Dollars in thousands]

		Funding Characteristics											
	No.	FFAS[2]	EGI[3]	DOD	NASA	AEC	USPHS	NSF	USOE	USDA	Other	R_{fe}[4]	R_{fd}[5]
Total Institutions	1,063	$1,099,481	$4,346,393	$199,400	$42,122	$62,244	$499,527	$227,323	$19,680	$41,697	$7,488	*0.202*	3,967
Average		1,034	4,089	188	40	59	470	214	19	39	7		
Percent[1]		*100.0*	—	*18.1*	*3.8*	*5.7*	*45.4*	*20.7*	*1.8*	*3.8*	*0.7*		
Class A	169	1,045,622	2,864,882	192,616	41,542	61,268	488,097	195,828	18,120	40,901	7,250	*0.267*	5,063
Average		6,187	16,952	1,140	246	363	2,888	1,159	107	242	43		
Percent[1]	*15.9*	*100.0*	—	*18.4*	*4.0*	*5.8*	*46.7*	*18.7*	*1.8*	*3.9*	*0.7*		
Medical Education Associated	80	757,930	1,858,023	119,802	24,031	37,769	419,318	122,924	10,619	19,663	3,804	*0.290*	5,721
Average		9,474	23,225	1,498	300	472	5,241	1,537	133	246	48		
Percent[1]	*7.5*	*100.0*	—	*15.8*	*3.2*	*5.0*	*55.3*	*16.2*	*1.4*	*2.6*	*0.5*		
Nonmedical Education Associated	89	287,692	1,006,859	72,814	17,511	23,499	68,779	72,904	7,501	21,238	3,446	*0.222*	3,885
Average		3,232	11,313	818	197	264	773	819	84	239	39		
Percent[1]	*8.4*	*100.0*	—	*25.3*	*6.1*	*8.1*	*23.9*	*25.4*	*2.6*	*7.3*	*1.2*		

Table C–13.—*Continued*

Manpower Dynamics

	No.	FFAS[2]	EGI[3]	Enrollment		R_e[6]	Science and Technology							R_s[7]
				Total	Graduate		S&T DP	BA	MA	PhD	DVM	MD	DDS	
Total Institutions	1,063	$1,099,481	$4,346,393	3,425,456	369,964	0.108	277,149	132,436	26,761	7,963	823	6,873	3,181	*0.081*
Average		1,034	4,089	3,222	348		261	125	25	7	1	6	3	
Percent[1]	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*		*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	*100.0*	
Class A	169	1,045,622	2,864,882	1,701,687	263,699	0.155	206,533	71,528	22,902	7,963	814	6,873	3,181	*.121*
Average		6,187	16,952	10,069	1,560		1,222	423	136	47	5	41	19	
Percent[1]	*15.9*	*95.1*	*65.9*	*49.6*	*71.2*		*74.5*	*54.0*	*85.5*	*100.0*	*98.9*	*100.0*	*100.0*	
Medical Education														
Associated	80	757,930	1,858,023	1,027,517	173,922	0.169	132,486	37,793	12,868	4,959	269	6,873	3,024	*.129*
Average		9,474	23,225	12,844	2,174		1,656	472	161	62	3	86	38	
Percent[1]	*7.5*	*68.9*	*42.7*	*30.0*	*47.0*		*47.8*	*28.5*	*48.1*	*62.3*	*32.7*	*100.0*	*95.1*	
Nonmedical Education														
Associated	89	287,692	1,006,859	674,170	89,777	0.133	74,047	33,735	10,034	3,004	545	0	157	*.110*
Average		3,232	11,313	7,575	1,009		832	379	113	34	6	0	2	
Percent[1]	*8.4*	*26.2*	*23.2*	*19.7*	*24.3*		*26.7*	*25.5*	*37.5*	*37.7*	*66.2*	0	*4.9*	

[1] Percent detail may not add to 100 because of rounding.

[2] FFAS = Federal Funds for Academic Science.

[3] EGI = Educational and General Income.

[4] R_{fe} = Federal funds for academic science/total institutional income.

[5] R_{fd} = Federal funds for academic science/science and technology degree productivity.

[6] R_e = Graduate student enrollment/total enrollment.

[7] R_s = Science and technology degree productivity/total enrollment.

Table C–14.—*Funding and Manpower Characteristics of Class A Private Control Medical Education Associated Universities*

Rank Ordered by Federal Funds

Institution	Rank Order	Enrollment			Science and Engineering				(dollars in thousands)						
		Total	Graduate	R_e[1]	S&T DP[2]	BA	PhD	R_s[3]	EGI[4]	FFAS[5]	R_{fe}[6]	USPHS-FAS[7] / FFAS	DOD-FAS[8] / FFAS	NSF-FAS[9] / FFAS	R_{fd}[10]
Columbia University	1	24,000	8,503	0.354	3,650	698	202	0.152	$45,563	$42,530	0.483	0.373	0.365	0.132	$11,652
Harvard University	4	13,646	3,618	0.265	3,119	770	244	0.229	54,824	31,251	0.363	0.650	0.104	0.202	10,020
Stanford University	6	9,934	3,200	0.322	3,145	817	181	0.317	43,352	28,938	0.400	0.299	0.315	0.271	9,201
Chicago, University of	8	8,233	2,853	0.347	1,977	289	169	0.240	22,375	24,668	0.524	0.457	0.190	0.207	12,477
Johns Hopkins University	10	8,240	1,565	0.190	1,181	354	75	0.143	14,243	22,632	0.614	0.649	0.152	0.132	19,163
Pennsylvania, University of	12	18,347	5,448	0.297	2,711	508	95	0.148	65,361	20,709	0.241	0.566	0.219	0.166	7,639
Cornell University	13	12,687	2,645	0.208	2,789	942	155	0.220	70,761	20,440	0.224	0.421	0.251	0.198	7,329
New York University	15	33,232	12,040	0.362	4,450	828	145	0.134	57,257	19,857	0.258	0.604	0.221	0.073	4,462
Yale University	16	8,364	2,436	0.291	1,868	460	117	0.223	34,378	19,472	0.362	0.493	0.098	0.180	10,424
Pittsburgh, University of	20	13,938	3,729	0.268	1,942	583	75	0.139	26,092	13,825	0.346	0.677	0.089	0.112	7,119
Rochester, University of	21	7,126	1,369	0.192	1,054	294	59	0.148	25,513	13,092	0.339	0.434	0.059	0.382	12,421
Washington University	23	14,602	2,081	0.143	1,372	342	51	0.094	17,213	12,229	0.417	0.762	0.048	0.130	8,913
Duke University	24	6,345	1,003	0.158	1,225	378	74	0.193	16,589	11,737	0.414	0.615	0.168	0.135	9,581
Northwestern University	26	16,636	1,551	0.093	2,301	528	107	0.138	24,175	11,179	0.316	0.476	0.287	0.156	4,858
Western Reserve University	30	8,056	2,606	0.323	1,041	197	35	0.129	13,046	9,980	0.433	0.797	0.054	0.068	9,587
Southern California, University of	35	18,447	7,035	0.381	2,127	377	53	0.115	20,589	8,727	0.298	0.566	0.171	0.126	4,103
Tulane University	38	7,107	1,095	0.154	1,001	245	30	0.141	17,503	8,286	0.321	0.848	0.028	0.069	8,278
Miami, University of	45	12,053	797	0.066	859	435	11	0.071	15,261	6,822	0.309	0.515	0.207	0.198	7,942
Vanderbilt University	48	4,202	606	0.144	803	300	33	0.191	11,502	6,345	0.356	0.746	0.067	0.088	7,902
Boston University	59	19,589	1,551	0.079	1,212	479	29	0.062	18,436	5,433	0.228	0.882	0.017	0.065	4,483
George Washington University	69	14,031	2,892	0.206	1,114	266	17	0.079	16,700	4,372	0.207	0.409	0.428	0.053	3,925
Tufts University	71	4,586	520	0.113	1,246	380	10	0.272	7,208	4,083	0.362	0.712	0.099	0.106	3,277

Table C–14.—*Funding and Manpower Characteristics of Class A Private Control Medical Education Associated Universities—Continued*

Rank Ordered by Federal Funds

Institution	Rank Order	Enrollment			Science and Engineering				(dollars in thousands)			USPHS-FAS[7]	DOD-FAS[8]	NSF-FAS[9]	
		Total	Graduate	R_e[1]	S&T DP[2]	BA	PhD	R_s[3]	EGI[4]	FFAS[5]	R_{fe}[6]	FFAS	FFAS	FFAS	R_{fd}[10]
Temple University	81	20,698	5,069	0.245	1,556	259	16	0.075	18,112	3,389	0.158	0.776	0.050	0.115	2,178
Jefferson Medical College	107	791	148	0.187	641	0	8	0.810	3,504	2,243	0.390	1.000	0	0	3,499
Hahnemann Medical College	111	477	86	0.180	373	0	2	0.782	1,962	2,008	0.506	0.980	0	0.020	5,383
Union College	115	2,846	322	0.113	582	199	4	0.204	2,573	1,904	0.425	0.836	0.037	0.115	3,271

[1] R_e = Graduate student enrollment/total enrollment.
[2] S&T DP = Science and Technology Degree Productivity.
[3] R_s = Science and technology degree productivity/total enrollment.
[4] EGI = Educational and General Income.
[5] FFAS = Federal Funds for Academic Science.
[6] R_{fe} = Federal funds for academic science/total institutional income.
[7] USPHS FAS = Funds for academic science from the USPHS.
[8] DOD FAS = Funds for academic science from the DOD.
[9] NSF FAS = " " " " " NSF.
[10] R_{fd} = Federal funds for academic science/science and technology degree productivity.

Table C-15.—Rank Order of 200 Academic Institutions by Funding and by Productivity in Science Education, Academic Year 1962–1963 (Fiscal Year 1963)

Institutions	FFAS[1]	EGI[2]	FFAS + EGI	Enrollment		S&T DP[3]	BA	MA	PhD
				Total	Graduate				
Columbia University	1	12	5	13	2	9	29	8	9
Massachusetts Institute of Technology	2	50	15	141	33	10	27	6	4
Michigan, University of	3	5	2	8	3	2	7	2	7
Harvard University	4	9	6	53	20	14	25	21	6
California, University of (Berkeley)	5	8	8	12	5	3	1	5	2
Stanford University	6	15	11	85	24	13	22	7	11
Illinois, University of	7	1	1	3	10	1	2	1	1
Chicago, University of	8	39	25	109	28	28	124	22	12
Minnesota, University of	9	3	3	1	6	7	4	15	8
Johns Hopkins University	10	75	32	108	65	62	97	102	31
Washington, University of	11	22	16	14	22	16	12	16	32
Pennsylvania, University of	12	4	7	33	9	19	56	17	25
Cornell University	13	2	4	61	32	17	16	20	15
Wisconsin, University of	14	10	12	2	7	6	5	9	3
New York University	15	6	9	4	1	5	20	3	16
Yale University	16	23	17	106	36	32	70	25	21
California, University of (Los Angeles)	17	13	13	25	8	15	10	10	14
Texas, University of	18	7	10	15	30	11	11	28	17
Ohio State University	19	11	14	6	13	8	13	13	10
Pittsburgh, University of	20	32	28	49	17	29	41	62	32
Rochester, University of	21	35	29	127	78	74	121	83	41

[1] FFAS = Federal Funds for Academic Science.
[2] EGI = Educational and General Income.
[3] S&T DP = Science and Technology Degree Productivity.

Table C–15.—*Continued*

Institutions	FFAS[1]	EGI[2]	FFAS + EGI	Enrollment		S&T DP[3]	BA	MA	PhD
				Total	Graduate				
Maryland, University of	22	25	26	10	12	26	32	57	28
Washington University	23	61	40	45	44	46	99	65	48
Duke University	24	64	43	145	108	58	93	103	33
Colorado, University of	25	31	30	30	47	35	30	29	35
Northwestern University	26	36	33	39	66	22	50	37	23
California, University of (San Diego)	27	173	85	1054	280	624	—	254	130
North Carolina, University of at Chapel Hill	28	37	35	77	51	44	79	75	37
Princeton University	29	16	18	211	114	52	98	53	19
Western Reserve University	30	81	58	111	34	76	172	120	64
Indiana University	31	21	21	5	18	23	68	50	24
Yeshiva University	32	143	81	270	146	128	274	174	121
California Institute of Technology	33	115	75	517	153	98	248	61	26
Purdue University	34	20	22	17	25	4	3	4	5
Southern California, University of	35	46	41	32	4	25	94	14	45
California, University of (Davis)	36	55	46	215	143	89	131	73	39
Utah, University of	37	66	54	55	42	50	40	86	36
Tulane University	38	58	49	130	100	83	144	124	70
Florida, University of	39	19	20	51	46	36	21	41	40
Oregon, University of	40	83	68	76	72	51	104	74	71
Iowa, University of	41	24	27	66	35	27	46	40	27
Pennsylvania State University	42	14	19	27	38	18	6	18	18
Syracuse University	43	47	45	26	29	61	54	38	53
Brown University	44	86	72	202	134	112	107	125	47
Miami, University of	45	70	60	67	131	96	75	136	104
Baylor University	46	194	111	149	174	73	181	141	110

Oklahoma, University of	47	102	84	50	53	38	61	33	51
Vanderbilt University	48	89	77	207	160	100	119	105	68
Kentucky, University of	49	30	36	72	105	104	77	88	89
Tennessee, University of	50	26	31	35	60	21	35	31	44
Michigan State University	51	18	23	9	16	20	14	11	20
Alabama, University of	52	74	67	46	71	57	69	108	86
Kansas, University of	53	53	55	71	55	39	71	44	38
Rutgers, The State University	54	27	34	11	15	33	17	26	30
Wayne State University	55	29	38	19	14	37	48	45	61
Louisiana State University	56	28	37	34	48	30	38	34	29
Missouri, University of	57	17	24	16	27	12	9	12	50
Oregon State University	58	49	52	84	102	47	34	39	42
Boston University	59	52	56	29	67	59	63	64	72
Virginia, University of	60	38	44	59	99	71	86	87	56
Emory University	61	136	99	192	170	86	152	153	98
Arizona, University of	62	44	47	40	52	69	64	43	65
Carnegie Institute of Technology	63	135	100	180	122	82	100	56	34
Florida State University	64	84	79	80	70	125	142	106	60
California, University of (San Francisco)	65	67	66	298	261	97	569	209	87
Texas Agricultural and Mechanical College	66	117	94	36	111	45	31	48	54
Cincinnati, University of	67	72	69	24	94	54	52	77	66
Iowa State University of Science and Technology	68	45	51	74	63	24	18	30	13
George Washington University	69	63	65	48	26	67	134	49	90
Polytechnic Institute of Brooklyn	70	177	131	169	31	60	78	27	49
Tufts University	71	139	109	195	178	53	92	244	109
State University of New York—Buffalo	72	90	89	42	45	64	95	104	82
Puerto Rico, University of	73	34	39	18	168	87	33	202	—
Georgetown University	74	56	61	138	98	66	192	128	76
Case Institute of Technology	75	169	130	327	123	113	141	81	55
Nebraska, University of	76	40	48	79	69	42	59	51	52
Arkansas, University of	77	78	78	113	136	68	91	52	100

Table C–15.—*Continued*

Institutions	FFAS[1]	EGI[2]	FFAS + EGI	Enrollment		S&T DP[3]	BA	MA	PhD
				Total	Graduate				
Brandeis University	78	160	127	422	210	169	191	178	85
Rensselaer Polytechnic Institute	79	140	113	196	73	48	45	23	57
Vermont, University of	80	149	122	218	266	132	130	170	149
Temple University	81	54	62	20	11	40	138	93	95
Oklahoma State University of Agriculture & Applied Science	82	48	57	65	77	34	23	19	46
Georgia, University of	83	41	50	64	115	78	51	68	79
Hawaii, University of	84	69	73	70	137	114	102	69	97
Rockefeller Institute	85	141	116	1059	364	448	—	—	94
Georgia Institute of Technology	86	111	102	136	152	70	36	58	69
West Virginia University	87	57	64	87	127	77	76	67	118
Mississippi, University of	88	147	125	157	193	106	157	98	116
Virginia Medical College	89	167	140	595	373	90	118	250	128
Dartmouth College	90	88	90	263	409	148	85	188	—
Washington State University	91	43	53	107	138	85	65	90	67
Colorado State University	92	77	80	122	167	93	72	91	88
North Carolina State at Raleigh	93	33	42	63	95	41	19	47	43
St. Louis University	94	80	86	94	56	55	105	72	78
Denver, University of	95	120	110	156	103	175	194	142	137
Seton Hall College	96	174	149	93	59	123	193	234	—
Louisville, University of	97	112	105	142	154	88	156	145	101
Utah State University	98	98	93	114	184	105	89	89	80
Catholic University	99	172	144	174	41	122	236	66	63
Kansas State University	100	65	70	98	113	49	55	24	75
Marquette University	101	103	98	83	128	43	67	118	—
Notre Dame, University of	102	76	83	140	132	56	37	46	59

Rice University	103	181	162	363	192	145	149	133	74
Illinois Institute of Technology	104	159	142	129	81	91	62	82	58
Dayton, University of	105	193	166	121	307	174	114	339	—
Alaska University of	106	203	173	249	374	384	637	223	139
Jefferson Medical College	107	228	181	756	321	117	—	287	114
Virginia Polytechnic Institute	108	62	71	117	156	63	26	59	84
Connecticut, University of	109	73	82	58	61	79	47	54	73
Stevens Institute of Technology	110	262	190	355	112	102	189	32	93
Hahnemann Medical College	111	384	218	947	366	158	—	252	144
Wake Forest College	112	170	159	293	395	171	275	—	—
Boston College	113	113	115	99	79	130	88	114	—
Massachusetts, University of	114	76	87	124	110	84	44	71	77
Union College	115	301	202	297	222	126	171	135	133
Loma Linda University	116	205	180	612	362	121	—	311	—
Howard University	117	91	95	147	162	65	110	140	123
Rhode Island, University of	118	119	120	120	158	153	127	146	107
Mississippi State University	119	82	91	160	200	115	82	84	131
Northeastern University	120	101	106	28	39	81	53	36	—
Arizona State University	121	92	96	43	23	116	103	63	134
State University of New York–Downstate Medical Center	122	168	163	819	453	139	—	—	135
Delaware, University of	123	116	118	123	109	134	145	99	83
New Mexico, University of	124	148	141	101	76	119	146	70	91
Georgia Medical College	125	372	233	957	365	162	—	293	—
Montana State College	126	157	157	193	251	142	117	111	112
California, University of (Riverside)	127	110	117	359	212	210	226	179	146
New Hampshire, University of	128	123	129	223	216	120	122	80	102
Clemson Agricultural College	129	175	169	205	295	155	113	131	127
New Mexico State University	130	131	138	183	165	137	125	101	106
Loyola University (Illinois)	131	114	124	81	93	80	139	180	120
Lehigh University	132	150	154	232	96	108	96	79	81
South Dakota, University of	133	244	208	294	258	170	219	107	—

Table C–15.—*Continued*

Institutions	FFAS [1]	EGI [2]	FFAS + EGI	Enrollment		S&T DP [3]	BA	MA	PhD
				Total	Graduate				
Auburn University	134	59	74	96	129	95	57	96	124
South Carolina Medical College	135	476	325	1002	388	181	—	344	148
North Dakota State University	136	142	147	230	247	146	109	127	147
North Dakota, University of	137	145	151	168	189	165	196	112	155
American University	138	126	137	91	80	159	218	132	92
Maine, University of	139	122	135	139	299	144	87	154	151
Clark University	140	351	255	380	267	200	271	172	105
Idaho, University of	141	106	119	173	230	135	112	92	—
California, University of (Santa Barbara)	142	127	139	187	287	205	182	216	—
Wyoming, University of	143	107	123	166	185	127	126	76	119
Fordham University	144	118	132	97	64	101	123	60	62
Lowell Technological Institute	145	380	281	480	396	224	246	185	152
Houston, University of	146	121	136	52	89	140	115	113	113
George Peabody College for Teachers	147	308	247	405	166	196	554	115	115
Nevada, University of	148	144	156	188	284	203	211	167	—
San Diego State College	149	96	103	44	58	129	83	121	—
State University of New York–Upstate Medical Center	150	176	175	969	436	172	—	343	141
New Mexico Highlands University	151	502	371	572	297	449	690	217	—
Southern Illinois University	152	42	59	38	83	110	66	97	125
South Dakota State College	153	134	145	259	275	149	108	160	117
Adelphi University	154	161	170	137	91	138	132	85	132
Bryn Mawr College	155	279	240	624	242	282	417	229	111
South Carolina, University of	156	146	160	104	201	167	164	134	157
San Jose State College	157	71	88	22	62	99	39	95	—
Creighton University	158	207	199	268	271	133	384	238	—

Brigham Young University	159	87	97	57	176	118	60	143	138
City University of New York—The City College	160	60	76	7	21	31	8	35	—
New Mexico Institute of Mining and Technology	161	514	404	1018	441	596	732	273	154
Kansas State Teachers College	162	202	194	176	141	182	283	109	—
Drexel Institute of Technology	163	137	152	110	68	75	42	42	—
Reed College	164	423	357	703	435	406	375	—	—
Montana, University of	165	185	185	199	269	179	180	152	140
Southern Methodist University	166	152	164	128	130	131	159	55	159
Wesleyan University	167	156	167	584	344	212	297	144	—
State University of New York—Albany	168	200	197	234	198	189	262	122	—
Colorado State College	169	213	209	185	224	260	354	175	—
Ohio Wesleyan University	170	260	246	358	—	204	148	—	—
Texas Woman's University	171	328	284	286	233	425	445	307	—
Atlanta University	172	613	488	789	142	284	—	126	—
Clarkson College of Technology	173	346	305	445	410	187	184	158	—
Brooklyn College	174	79	92	23	50	72	15	157	—
St. Johns University	175	95	108	69	49	150	155	116	108
Detroit, University of	176	151	165	82	86	92	84	94	—
Manhattan College	177	230	223	243	353	152	80	271	—
Iowa, State College of	178	182	184	179	262	217	265	162	—
San Francisco State College	179	93	104	37	54	154	101	156	—
Bowling Green State University	180	124	143	103	188	161	163	119	—
Texas Christian University	181	184	188	143	159	190	179	169	—
Antioch College	182	272	262	452	—	363	334	—	—
William and Mary College	183	233	227	155	249	184	154	194	—
Texas Western College	184	283	269	170	250	239	183	—	—
North Carolina, Agricultural and Technical College of	185	325	293	290	232	383	355	—	—
Hunter College	186	68	87	21	40	94	24	163	—
Smith College	187	166	177	338	323	271	233	275	—
Tuskegee Institute	188	275	263	332	347	379	577	245	—
Amherst College	189	197	200	619	519	326	284	—	—

Table C–15.—*Continued*

Institutions	FFAS[1]	EGI[2]	FFAS + EGI	Enrollment		S&T DP[3]	BA	MA	PhD
				Total	Graduate				
Ohio University	190	99	114	56	164	136	81	137	156
State University of New York–Stony Brook	191	201	204	763	461	445	420	—	—
Virginia State College–Petersburg	192	257	252	224	341	362	347	319	—
Pomona College	193	317	292	608	—	272	220	—	—
Oklahoma City University	194	425	383	343	—	420	391	—	—
City University of New York–Queens College	195	130	150	54	104	151	90	212	—
Claremont Graduate School and University Center	196	424	385	791	180	395	—	233	103
Texas Technological College	197	133	153	73	171	103	43	110	136
Western Michigan University	198	109	134	62	84	160	135	148	—
Earlham College	199	408	377	615	503	353	321	—	—
Kent State University	200	94	107	47	107	164	167	123	—

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